



Relion® 615 Series

Transformer Protection and Control RET615 ANSI DNP3 Point List Manual



Document ID: 1MAC203317MB
Issued: 4/14/2011
Revision: B
Product version: 4.0

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This product complies with the directive of the Council of the European Communities on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2004/108/EC) and concerning electrical equipment for use within specified voltage limits (Low-voltage directive 2006/95/EC). This conformity is the result of tests conducted by ABB in accordance with the product standards EN 50263 and EN 60255-26 for the EMC directive, and with the product standards EN 60255-6 and EN 60255-27 for the low voltage directive. The IED is designed in accordance with the international standards of the IEC 60255 series and ANSI C37.90. The DNP protocol implementation in the IED conforms to "DNP3 Intelligent Electronic Device (IED) Certification Procedure Subset Level 2", available at www.dnp.org.

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Section 1 Introduction

1.1 This manual

The point list manual describes the outlook and properties of the data points specific to the IED. The manual should be used in conjunction with the corresponding communication protocol manual.

1.2 Intended audience

This manual addresses the communication system engineer or system integrator responsible for pre-engineering and engineering for communication setup in a substation from an IED perspective.

The system engineer or system integrator must have a basic knowledge of communication in protection and control systems and thorough knowledge of the specific communication protocol.

1.3 Product documentation

1.3.1 Product documentation set

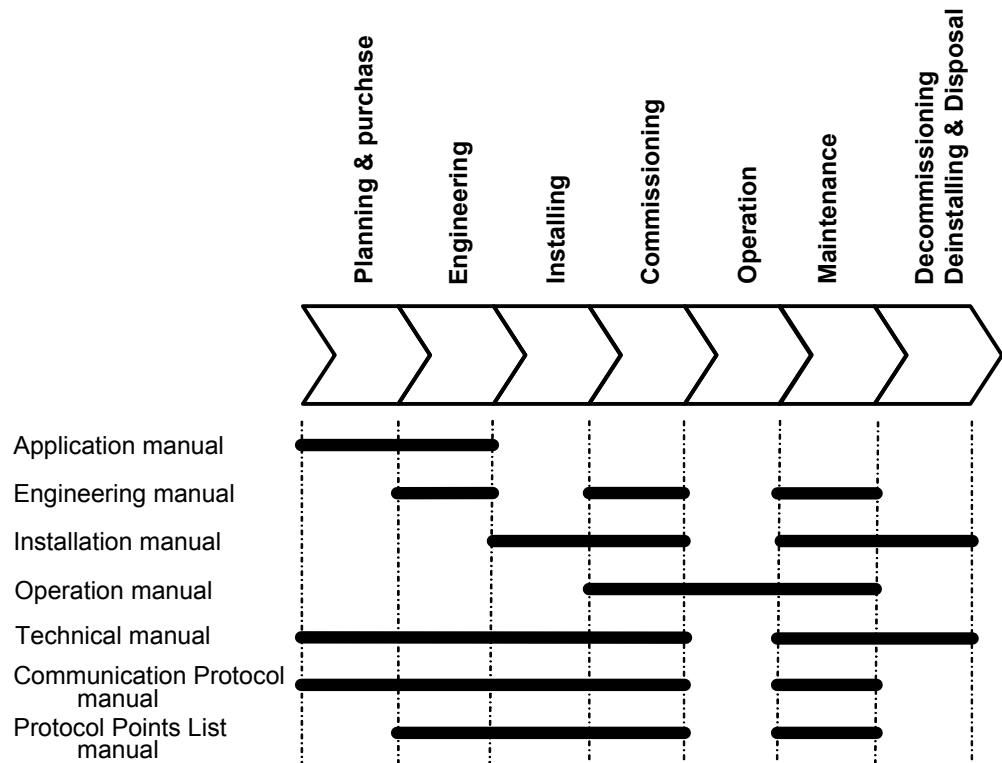


Figure 1: *The intended use of manuals in different lifecycles*

The engineering manual contains instructions on how to engineer the IEDs using the different tools in PCM600. The manual provides instructions on how to set up a PCM600 project and insert IEDs to the project structure. The manual also recommends a sequence for engineering of protection and control functions, LHMI functions as well as communication engineering for IEC 61850 and DNP3.

The installation manual contains instructions on how to install the IED. The manual provides procedures for mechanical and electrical installation. The chapters are organized in chronological order in which the IED should be installed.

The operation manual contains instructions on how to operate the IED once it has been commissioned. The manual provides instructions for monitoring, controlling and setting the IED. The manual also describes how to identify disturbances and how to view calculated and measured power grid data to determine the cause of a fault.

The application manual contains application descriptions and setting guidelines sorted per function. The manual can be used to find out when and for what purpose a typical protection function can be used. The manual can also be used when calculating settings.

The technical manual contains application and functionality descriptions and lists function blocks, logic diagrams, input and output signals, setting parameters and technical data

sorted per function. The manual can be used as a technical reference during the engineering phase, installation and commissioning phase, and during normal service.

The communication protocol manual describes a communication protocol supported by the IED. The manual concentrates on vendor-specific implementations. The point list manual describes the outlook and properties of the data points specific to the IED. The manual should be used in conjunction with the corresponding communication protocol manual.

1.3.2 Document revision history

Document revision/date	Product series version	History
A/01/20/2010	2.0	First release
B/03/31/2011	4.0	Contents updated for 615 series v4.0 ANSI release



Download the latest documents from the ABB web site
<http://www.abb.com/substationautomation>.

1.3.3 Related documentation

Name of the document	Document ID
DNP3 Communication Protocol Manual	1MAC052460-MB

1.4 Symbols and conventions

1.4.1 Safety indication symbols



The caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard which could result in corruption of software or damage to equipment or property.



The information icon alerts the reader to important facts and conditions.






The tip icon indicates advice on, for example, how to design your project or how to use a certain function.

Although warning hazards are related to personal injury, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, comply fully with all warning and caution notices.

1.4.2

Manual conventions

Conventions used in IED manuals. A particular convention may not be used in this manual.

- Abbreviations and acronyms in this manual are spelled out in the glossary. The glossary also contains definitions of important terms.
- Push button navigation in the LHMI menu structure is presented by using the push button icons, for example:
To navigate between the options, use  and .
- HMI menu paths are presented in bold, for example:
Select **Main menu > Settings**.
- LHMI messages are shown in Courier font, for example:
To save the changes in non-volatile memory, select `Yes` and press .
- Parameter names are shown in italics, for example:
The function can be enabled and disabled with the *Operation* setting.
- Parameter values are indicated with quotation marks, for example:
The corresponding parameter values are "Enabled" and "Disabled".
- IED input/output messages and monitored data names are shown in Courier font, for example:
When the function picks up, the `PICKUP` output is set to `TRUE`.
- Dimensions are provided both in inches and mm. If it is not specifically mentioned then the dimension is in mm.

1.4.3

Functions, codes and symbols

Table 1: Functions included in the RET615 standard configurations

Function	IEC61850	ANSI/C37.2 - 2008	IEC60617
Protection			
Three-phase non-directional overcurrent protection, low stage, instance 1	PHLPTOC1	51P (1)	3I> (1)
Three-phase non-directional overcurrent protection, low stage, instance 2	PHLPTOC2	51P (2)	3I> (2)
Three-phase non-directional overcurrent protection, high stage, instance 1	PHHPTOC1	50P-1 (1)	3I>> (1)
Three-phase non-directional overcurrent protection, high stage, instance 2	PHHPTOC2	50P-1 (2)	3I>> (2)
Three-phase non-directional overcurrent protection, high stage, instance 3	PHHPTOC3	50P-2 (1)	3I>> (3)
Three-phase non-directional overcurrent protection, high stage, instance 4	PHHPTOC4	50P-2 (2)	3I>> (4)
Three-phase directional overcurrent protection, low stage, instance 1	DPHLPDOC1	67/51P (2)	3I> -> (1)
Three-phase directional overcurrent protection, low stage, instance 2	DPHLPDOC2	67/51P (1)	3I> -> (2)
Non-directional ground-fault protection, low stage, instance 1	EFLPTOC1	51N (1)	Io> (1)
Non-directional ground-fault protection, low stage, instance 2	EFLPTOC2	51N (2)	Io> (2)
Non-directional ground-fault protection, low stage, instance 3	EFLPTOC3	51G	Io> (3)
Non-directional ground-fault protection, high stage, instance 1	EFHPTOC1	50G-1	Io>> (1)
Non-directional ground-fault protection, high stage, instance 2	EFHPTOC2	50G-2	Io>> (2)
Non-directional ground-fault protection, high stage, instance 3	EFHPTOC3	50N-1 (1)	Io>> (3)
Non-directional ground-fault protection, high stage, instance 4	EFHPTOC4	50N-1 (2)	Io>> (4)
Non-directional ground-fault protection, high stage, instance 5	EFHPTOC5	50N-2 (1)	Io>> (5)
Non-directional ground-fault protection, high stage, instance 6	EFHPTOC6	50N-2 (2)	Io>> (6)
Directional ground-fault protection, low stage, instance 1	DEFLPDEF1	67/51N (2)	Io> -> (1)
Directional ground-fault protection, low stage, instance 2	DEFLPDEF2	67/51N (1)	Io> -> (2)
Negative-sequence overcurrent protection, instance 1	NSPTOC1	46 (1)	I2> (1)
Negative-sequence overcurrent protection, instance 2	NSPTOC2	46 (2)	I2> (2)
Residual overvoltage protection, instance 1	ROVPTOV1	59G (2)	Uo> (1)
Residual overvoltage protection, instance 2	ROVPTOV2	59N (2)	Uo> (2)
Residual overvoltage protection, instance 3	ROVPTOV3	59N (1)	Uo> (3)

Function	IEC61850	ANSI/C37.2 - 2008	IEC60617
Residual overvoltage protection, instance 4	ROVPTOV4	59G (1)	Uo> (4)
Three-phase undervoltage protection, instance 1	PHPTUV1	27 (2)	3U< (1)
Three-phase undervoltage protection, instance 2	PHPTUV2	27 (1)	3U< (2)
Three-phase overvoltage protection, instance 1	PHPTOV1	59 (2)	3U> (1)
Three-phase overvoltage protection, instance 2	PHPTOV2	59 (1)	3U> (2)
Negative-sequence overvoltage protection, instance 1	NSPTOV1	47 (2)	U2> (1)
Negative-sequence overvoltage protection, instance 2	NSPTOV2	47 (1)	U2> (2)
Frequency protection, instance 1	FRPFRQ1	81-1 (2)	f>/f<,df/dt (1)
Frequency protection, instance 2	FRPFRQ2	81-2 (2)	f>/f<,df/dt (2)
Frequency protection, instance 3	FRPFRQ3	81-1 (1)	f>/f<,df/dt (3)
Frequency protection, instance 4	FRPFRQ4	81-2 (1)	f>/f<,df/dt (4)
Voltage per hertz protection, instance 1	OEPVPH1	24-1 (2)	U/f> (1)
Voltage per hertz protection, instance 2	OEPVPH2	24-2 (2)	U/f> (2)
Voltage per hertz protection, instance 3	OEPVPH3	24-1 (1)	U/f> (3)
Voltage per hertz protection, instance 4	OEPVPH4	24-2 (1)	U/f> (4)
Three-phase thermal overload protection for power transformers, two time constants	T2PTTR1	49T (1)	3lth>T
Stabilized and instantaneous differential protection for 2W –transformers	TR2PTDF1	87T	3dl>T
Numerical stabilized low impedance restricted ground-fault protection	LREFPND1	87LOZREF (2)	dIoLo>
Circuit breaker failure protection, instance 1	CCBRBRF1	50BF (2)	3I>/Io>BF (1)
Circuit breaker failure protection, instance 2	CCBRBRF2	50BF (1)	3I>/Io>BF (2)
Master trip, instance 1	TRPPTRC1	86/94-1	Master Trip (1)
Master trip, instance 2	TRPPTRC2	86/94-2	Master Trip (2)
Arc protection, instance 1	ARCSARC1	AFD-1 (2)	ARC (1)
Arc protection, instance 2	ARCSARC2	AFD-2 (2)	ARC (2)
Arc protection, instance 3	ARCSARC3	AFD-3 (2)	ARC (3)
Load shedding and restoration, instance 1	LSHDPFRQ1	81LSH-1 (2)	UFLS/R (1)
Load shedding and restoration, instance 2	LSHDPFRQ2	81LSH-2 (2)	UFLS/R (2)
Load shedding and restoration, instance 3	LSHDPFRQ3	81LSH-1 (1)	UFLS/R (3)
Load shedding and restoration, instance 4	LSHDPFRQ4	81LSH-2 (1)	UFLS/R (4)
Loss of phase, instance 1	PHPTUC1	37 (1)	3I< (1)
Control			
Circuit-breaker control, instance 1	CBXCBR1	52 (2)	I <-> O CB (1)

Function	IEC61850	ANSI/C37.2 - 2008	IEC60617
Circuit-breaker control, instance 2	CBXCBR2	52 (1)	I <-> O CB (2)
Tap changer position indication	TPOSSLTC1	84T	TPOSM
Condition Monitoring			
Circuit-breaker condition monitoring, instance 1	SSCBR1	52CM (2)	CBCM (1)
Circuit-breaker condition monitoring, instance 2	SSCBR2	52CM (1)	CBCM (2)
Trip circuit supervision, instance 1	TCSSCBR1	TCM-1	TCS (1)
Trip circuit supervision, instance 2	TCSSCBR2	TCM-2	TCS (2)
Advanced current circuit supervision for transformers	CTSRCTF1	MCS 3I, I2	MCS 3I, I2
Fuse failure supervision, instance 1	SEQRFUF1	60 (2)	FUSEF (1)
Fuse failure supervision, instance 2	SEQRFUF2	60 (1)	FUSEF (2)
Measurement			
Three-phase current measurement, instance 1	CMMXU1	IA, IB, IC (2)	3I
Three-phase current measurement, instance 2	CMMXU2	IA, IB, IC (1)	3I(B)
Sequence current measurement, instance 1	CSMSQI1	I1, I2, I0 (2)	I1, I2, I0
Sequence current measurement, instance 2	CSMSQI2	I1, I2, I0 (1)	I1, I2, I0(B)
Residual current measurement, instance 1	RESCMMXU1	IG	Io
Three-phase voltage measurement, instance 1	VMMXU1	VA, VB, VC (2)	3U
Three-phase voltage measurement, instance 2	VMMXU2	VA, VB, VC (1)	3U(B)
Residual voltage measurement	RESVMMXU1	VG	Uo
Sequence voltage measurement, instance 1	VSMSQI1	V1, V2, V0 (2)	U1, U2, U0
Sequence voltage measurement, instance 2	VSMSQI2	V1, V2, V0 (1)	U1, U2, U0(B)
Single-phase power and energy measurement, instance 1	SPEMMXU1	SP, SE (2)	SP, SE
Single-phase power and energy measurement, instance 2	SPEMMXU2	SP, SE (1)	SP, SE(B)
Three-phase power and energy measurement, instance 1	PEMMXU1	P, E (2)	P, E
Three-phase power and energy measurement, instance 2	PEMMXU2	P, E (1)	P, E(B)
Frequency measurement	FMMXU1	f	f
Recorder			
Disturbance recorder	RDRE1	DFR	-
Fault recorder	FLMSTA1	FR	-
Sequence event recorder	SER	SER	-
Other Functions			
Minimum pulse timer (2 pcs), instance 1	TPGAPC1	TP-1	TP (1)

Function	IEC61850	ANSI/C37.2 - 2008	IEC60617
Minimum pulse timer (2 pcs), instance 2	TPGAPC2	TP-2	TP (2)
Minimum pulse timer (2 pcs), instance 3	TPGAPC3	TP-3	TP (3)
Minimum pulse timer (2 pcs), instance 4	TPGAPC4	TP-4	TP (4)
Pulse timer (8 pcs), instance 1	PTGAPC1	PT-1	PT (1)
Pulse timer (8 pcs), instance 2	PTGAPC2	PT-2	PT (2)
Time delay off (8 pcs), instance 1	TOFGAPC1	TOF-1	TOF (1)
Time delay off (8 pcs), instance 2	TOFGAPC2	TOF-2	TOF (2)
Time delay on (8 pcs), instance 1	TONGAPC1	TON -1	TON (1)
Time delay on (8 pcs), instance 2	TONGAPC2	TON -2	TON (2)
Set reset (8 pcs), instance 1	SRGAPC1	SR-1	SR (1)
Set reset (8 pcs), instance 2	SRGAPC2	SR-2	SR (2)
Move (8 pcs), instance 1	MVGAPC1	MV-1	MV (1)
Move (8 pcs), instance 2	MVGAPC2	MV-2	MV (2)

Section 2 DNP3 data mappings

2.1 Overview

This document describes the DNP3 data points and structures available in RET615 Ver. 4.0 ANSI.

The point tables show all the available DNP3 data points in this IED. The data objects in the point tables are listed based on the IEC61850 logical node name. Also the default point indexes, class assignments and scaling configurations are shown. The DNP3 points can be freely added, removed, reorganized and reconfigured using PCM600.

This list represents the superset of DNP3 points. The actual set of available points is determined by the IED's ordercode. A "Yes" in a "No Events" column indicates that no events can be generated for that point regardless of class assignment. A "No" in "Enabled" column indicates that the point is not active. Inactive points can be made active through PCM600.

2.2 Binary/Analog Inputs

Table 2: General Device Information (LLN0)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		0	Class 1 and 0	Yes	Protection LLN0 Settings Reservation		LD0.LLN0.SetSeld.stVal
BI		1	Class 1 and 0	Yes	Protection LLN0 Settings Change		LD0.LLN0.SetChg.stVal
BI		588	Class 1 and 0	Yes	Local / Remote (1- Local; 0-Remote)		CTRL.LLN0.Loc.stVal
BI	Yes	604	Class 0	Yes	Protection LLN0 Reset all power quality data		LD0.LLN0.PQRs.stVal
AI		406	Class 2 and 0	Yes	Local / Remote state	0	CTRL.LLN0.LocRem.stVal

Table 3: Device Physical Information (LPHD1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	2	Class 0	Yes	Physical Device Reset Device		LD0.LPHD1.RsDev.stVal
AI		0	Class 2 and 0	Yes	General Device State	0	LD0.LPHD1.PhyHealth.stVal
AI		1	Class 2 and 0	Yes	Physical Sevice Warning	0	LD0.LPHD1.PhyHealth1.stVal
AI	Yes	2	Class 0	Yes	Number Of Power Ups	0	LD0.LPHD1.NumPwrUp.stVal
AI	Yes	3	Class 0	Yes	Number Of Warm Starts	0	LD0.LPHD1.WrmStr.stVal
AI	Yes	4	Class 0	Yes	Number Of Watchdog Device Resets	0	LD0.LPHD1.WacTrg.stVal
AI		402	Class 2 and 0	Yes	Internal Fault	1	LD0.LPHD1.PhyHealth2.stVal

Table 4: LED Condition monitoring (LEDPTRC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	IEC61850 Data Attribute Name	Description	Scale Factor
BI		3	Class 1 and 0	Yes	LD0.LEDPTRC1.Op.general	Global Conditioning Trip (Operate)	
BI		4	Class 1 and 0	Yes	LD0.LEDPTRC1.Op.phsA	Global Conditioning Phase-A Trip (Operate)	
BI		5	Class 1 and 0	Yes	LD0.LEDPTRC1.Op.phsB	Global Conditioning Phase-B Trip (Operate)	
BI		6	Class 1 and 0	Yes	LD0.LEDPTRC1.Op.phsC	Global Conditioning Phase-C Trip (Operate)	

Table 5: LED Status (LEDGGIO1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		150	Class 1 and 0	Yes	Led 1 On		LD0.LEDGGIO1.SPCSO1.stVal
BI		151	Class 1 and 0	Yes	Led 2 On		LD0.LEDGGIO1.SPCSO2.stVal
BI		152	Class 1 and 0	Yes	Led 3 On		LD0.LEDGGIO1.SPCSO3.stVal
BI		153	Class 1 and 0	Yes	Led 4 On		LD0.LEDGGIO1.SPCSO4.stVal
BI		154	Class 1 and 0	Yes	Led 5 On		LD0.LEDGGIO1.SPCSO5.stVal
BI		155	Class 1 and 0	Yes	Led 6 On		LD0.LEDGGIO1.SPCSO6.stVal
BI		156	Class 1 and 0	Yes	Led 7 On		LD0.LEDGGIO1.SPCSO7.stVal
BI		157	Class 1 and 0	Yes	Led 8 On		LD0.LEDGGIO1.SPCSO8.stVal
BI		158	Class 1 and 0	Yes	Led 9 On		LD0.LEDGGIO1.SPCSO9.stVal
BI		159	Class 1 and 0	Yes	Led 10 On		LD0.LEDGGIO1.SPCSO10.stVal
BI		160	Class 1 and 0	Yes	Led 11 On		LD0.LEDGGIO1.SPCSO11.stVal

Table 6: X100 - Binary Inputs/Outputs (XGGIO100)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		144	Class 1 and 0	Yes	X100-Output 1 PSM		LD0.XGGIO100.SPCSO1.stVal
BI		145	Class 1 and 0	Yes	X100-Output 2 PSM		LD0.XGGIO100.SPCSO2.stVal
BI		146	Class 1 and 0	Yes	X100-Output 3 PSM		LD0.XGGIO100.SPCSO3.stVal
BI		147	Class 1 and 0	Yes	X100-Output 4 PSM		LD0.XGGIO100.SPCSO4.stVal
BI		148	Class 1 and 0	Yes	X100-Output 5 PSM		LD0.XGGIO100.SPCSO5.stVal
BI		149	Class 1 and 0	Yes	X100-Output 6 PSM		LD0.XGGIO100.SPCSO6.stVal

Table 7: X110 - Binary Inputs/Outputs (XGGIO110)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		128	Class 1 and 0	Yes	X110-Input 1 BIO		LD0.XGGIO110.Ind1.stVal
BI		129	Class 1 and 0	Yes	X110-Input 2 BIO		LD0.XGGIO110.Ind2.stVal
BI		130	Class 1 and 0	Yes	X110-Input 3 BIO		LD0.XGGIO110.Ind3.stVal
BI		131	Class 1 and 0	Yes	X110-Input 4 BIO		LD0.XGGIO110.Ind4.stVal
BI		132	Class 1 and 0	Yes	X110-Input 5 BIO		LD0.XGGIO110.Ind5.stVal
BI		133	Class 1 and 0	Yes	X110-Input 6 BIO		LD0.XGGIO110.Ind6.stVal
BI		134	Class 1 and 0	Yes	X110-Input 7 BIO		LD0.XGGIO110.Ind7.stVal
BI		135	Class 1 and 0	Yes	X110-Input 8 BIO		LD0.XGGIO110.Ind8.stVal
BI		136	Class 1 and 0	Yes	X110-Output 1 BIO		LD0.XGGIO110.SPCSO1.stVal
BI		137	Class 1 and 0	Yes	X110-Output 2 BIO		LD0.XGGIO110.SPCSO2.stVal
BI		138	Class 1 and 0	Yes	X110-Output 3 BIO		LD0.XGGIO110.SPCSO3.stVal
BI		139	Class 1 and 0	Yes	X110-Output 4 BIO		LD0.XGGIO110.SPCSO4.stVal

Table 8: X130 - Binary Inputs/Outputs (XGGIO130)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		115	Class 1 and 0	Yes	X130-Input 1		LD0.XGGIO130.Ind1.stVal
BI		116	Class 1 and 0	Yes	X130-Input 2		LD0.XGGIO130.Ind2.stVal
BI		117	Class 1 and 0	Yes	X130-Input 3		LD0.XGGIO130.Ind3.stVal
BI		118	Class 1 and 0	Yes	X130-Input 4		LD0.XGGIO130.Ind4.stVal
BI		119	Class 1 and 0	Yes	X130-Input 5		LD0.XGGIO130.Ind5.stVal
BI		120	Class 1 and 0	Yes	X130-Input 6		LD0.XGGIO130.Ind6.stVal
BI		121	Class 1 and 0	Yes	X130-Output 1		LD0.XGGIO130.SPCSO1.stVal
BI		122	Class 1 and 0	Yes	X130-Output 2		LD0.XGGIO130.SPCSO2.stVal
BI		123	Class 1 and 0	Yes	X130-Output 3		LD0.XGGIO130.SPCSO3.stVal

Table 9: X120 - Binary Inputs/Outputs (XGGIO120)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		124	Class 1 and 0	Yes	X120 (AIM) X120-Input 1		LD0.XGGIO120.Ind1.stVal
BI		125	Class 1 and 0	Yes	X120 (AIM) X120-Input 2		LD0.XGGIO120.Ind2.stVal
BI		126	Class 1 and 0	Yes	X120 (AIM) X120-Input 3		LD0.XGGIO120.Ind3.stVal
BI		127	Class 1 and 0	Yes	X120 (AIM) X120-Input 4		LD0.XGGIO120.Ind4.stVal

Table 10: 51P (1):Three-phase non-directional overcurrent protection - low stage - instance 1 (PHLPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		210	Class 1 and 0	Yes	51P (1) Trip (Operate)		LD0.PHLPTOC1.Op.general
BI		211	Class 1 and 0	Yes	51P (1) Phase A Trip (Operate)		LD0.PHLPTOC1.Op.phsA
BI		212	Class 1 and 0	Yes	51P (1) Phase B Trip (Operate)		LD0.PHLPTOC1.Op.phsB
BI		213	Class 1 and 0	Yes	51P (1) Phase C Trip (Operate)		LD0.PHLPTOC1.Op.phsC
BI	Yes	214	Class 0	Yes	51P (1) Enable Signal For Current Multiplier		LD0.PHLPTOC1.InEnaMult.st Val

Table 11: Table - 51P (2):Three-phase non-directional overcurrent protection - low stage - instance 2 (PHLPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		215	Class 1 and 0	Yes	51P (2) Trip (Operate)		LD0.PHLPTOC2.Op.general
BI		216	Class 1 and 0	Yes	51P (2) Phase A Trip (Operate)		LD0.PHLPTOC2.Op.phsA
BI		217	Class 1 and 0	Yes	51P (2) Phase B Trip (Operate)		LD0.PHLPTOC2.Op.phsB
BI		218	Class 1 and 0	Yes	51P (2) Phase C Trip (Operate)		LD0.PHLPTOC2.Op.phsC

Table 12: 50P-1 (1):Three-phase non-directional overcurrent protection - high stage - instance 1 (PHHPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		192	Class 1 and 0	Yes	50P-1 (1) Trip (Operate)		LD0.PHHPTOC1.Op.general
BI		193	Class 1 and 0	Yes	50P-1 (1) Phase A Trip (Operate)		LD0.PHHPTOC1.Op.phsA
BI		194	Class 1 and 0	Yes	50P-1 (1) Phase B Trip (Operate)		LD0.PHHPTOC1.Op.phsB
BI		195	Class 1 and 0	Yes	50P-1 (1) Phase C Trip (Operate)		LD0.PHHPTOC1.Op.phsC
BI	Yes	196	Class 0	Yes	50P-1 (1) Enable Signal For Current Multiplier		LD0.PHHPTOC1.InEnaMult.st Val

Table 13: 50P-1 (2):Three-phase non-directional overcurrent protection - high stage - instance 2 (PHHPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		197	Class 1 and 0	Yes	50P-1 (2) Trip (Operate)		LD0.PHHPTOC2.Op.general
BI		198	Class 1 and 0	Yes	50P-1 (2) Phase A Trip (Operate)		LD0.PHHPTOC2.Op.phsA
BI		199	Class 1 and 0	Yes	50P-1 (2) Phase B Trip (Operate)		LD0.PHHPTOC2.Op.phsB
BI		200	Class 1 and 0	Yes	50P-1 (2) Phase C Trip (Operate)		LD0.PHHPTOC2.Op.phsC
BI	Yes	201	Class 0	Yes	50P-1 (2) Enable Signal For Current Multiplier		LD0.PHHPTOC2.InEnaMult.st Val

Table 14: 50P-2 (1):Three-phase non-directional overcurrent protection - high stage - instance 3 (PHHPTOC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		202	Class 1 and 0	Yes	50P-2 (1) Trip (Operate)		LD0.PHHPTOC3.Op.general
BI		203	Class 1 and 0	Yes	50P-2 (1) Phase A Trip (Operate)		LD0.PHHPTOC3.Op.phsA
BI		204	Class 1 and 0	Yes	50P-2 (1) Phase B Trip (Operate)		LD0.PHHPTOC3.Op.phsB
BI		205	Class 1 and 0	Yes	50P-2 (1) Phase C Trip (Operate)		LD0.PHHPTOC3.Op.phsC

Table 15: 50P-2 (2):Three-phase non-directional overcurrent protection - high stage - instance 4 (PHHPTOC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		206	Class 1 and 0	Yes	50P-2 (2) Trip (Operate)		LD0.PHHPTOC4.Op.general
BI		207	Class 1 and 0	Yes	50P-2 (2) Phase A Trip (Operate)		LD0.PHHPTOC4.Op.phsA
BI		208	Class 1 and 0	Yes	50P-2 (2) Phase B Trip (Operate)		LD0.PHHPTOC4.Op.phsB
BI		209	Class 1 and 0	Yes	50P-2 (2) Phase C Trip (Operate)		LD0.PHHPTOC4.Op.phsC

Table 16: 67/51P (2):Three-phase directional overcurrent protection - low stage - instance 1 (DPHLPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	IEC61850 Data Attribute Name	Description	Scale Factor
BI		249	Class 1 and 0	Yes	LD0.DPHLPTOC1.Op.general	67/51P (2) Trip (Operate)	
BI		250	Class 1 and 0	Yes	LD0.DPHLPTOC1.Op.phsA	67/51P (2) Phase A Trip (Operate)	
BI		251	Class 1 and 0	Yes	LD0.DPHLPTOC1.Op.phsB	67/51P (2) Phase B Trip (Operate)	
BI		252	Class 1 and 0	Yes	LD0.DPHLPTOC1.Op.phsC	67/51P (2) Phase C Trip (Operate)	

Table 17: 67/51P (1):Three-phase directional overcurrent protection - low stage - instance 2 (DPHLPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		253	Class 1 and 0	Yes	67/51P (1) Trip (Operate)		LD0.DPHLPTOC2.Op.general
BI		254	Class 1 and 0	Yes	67/51P (1) Phase A Trip (Operate)		LD0.DPHLPTOC2.Op.phsA
BI		255	Class 1 and 0	Yes	67/51P (1) Phase B Trip (Operate)		LD0.DPHLPTOC2.Op.phsB
BI		256	Class 1 and 0	Yes	67/51P (1) Phase C Trip (Operate)		LD0.DPHLPTOC2.Op.phsC

Table 18: 51G:Non-directional ground-fault protection - low stage - instance 1 (EFLPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		100	Class 1 and 0	Yes	51G Trip (Operate)		LD0.EFLPTOC1.Op.general
BI	Yes	101	Class 0	Yes	51G Enable Current Multiplier		LD0.EFLPTOC1.InEnaMult.st Val

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Table 19: 51N (1):Non-directional ground-fault protection - low stage - instance 2 (EFLPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		102	Class 1 and 0	Yes	51N (1) Trip (Operate)		LD0.EFLPTOC2.Op.general

Table 20: 51N (2):Non-directional ground-fault protection - low stage - instance 3 (EFLPTOC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		103	Class 1 and 0	Yes	51N (2) Trip (Operate)		LD0.EFLPTOC3.Op.general

Table 21: 50G-1:Non-directional ground-fault protection - high stage - instance 1 (EFHPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		98	Class 1 and 0	Yes	50G-1 Trip (Operate)		LD0.EFHPTOC1.Op.general
BI	Yes	99	Class 0	Yes	50G-1 Enable Current Multiplier		LD0.EFHPTOC1.InEnaMult.stVal

Table 22: 50G-2:Non-directional ground-fault protection - high stage - instance 2 (EFHPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		106	Class 1 and 0	Yes	50G-2 Trip (Operate)		LD0.EFHPTOC2.Op.general

Table 23: 50N-1 (1):Non-directional ground-fault protection - high stage - instance 3 (EFHPTOC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		107	Class 1 and 0	Yes	50N-1 (1) Trip (Operate)		LD0.EFHPTOC3.Op.general

Table 24: 50N-1 (2):Non-directional ground-fault protection - high stage - instance 4 (EFHPTOC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		108	Class 1 and 0	Yes	50N-1 (2) Trip (Operate)		LD0.EFHPTOC4.Op.general

Table 25: 50N-2 (1):Non-directional ground-fault protection - high stage - instance 5 (EFHPTOC5)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		109	Class 1 and 0	Yes	50N-2 (1) Trip (Operate)		LD0.EFHPTOC5.Op.general

Table 26: 50N-2 (2):Non-directional ground-fault protection - high stage - instance 6 (EFHPTOC6)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		110	Class 1 and 0	Yes	50N-2 (2) Trip (Operate)		LD0.EFHPTOC6.Op.general

Table 27: 67/51N (2):Directional ground-fault protection - low stage - instance 1 (DEFLPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		113	Class 1 and 0	Yes	67/51N (2) Trip (Operate)		LD0.DEFLPTOC1.Op.general

Table 28: 67/51N (1):Directional ground-fault protection - low stage - instance 2 (DEFLPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		114	Class 1 and 0	Yes	67/51N (1) Trip (Operate)		LD0.DEFLPTOC2.Op.general

Table 29: 46 (1):Negative-sequence overcurrent protection - instance 1 (NSPTOC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		281	Class 1 and 0	Yes	46 (1) Trip (Operate)		LD0.NSPTOC1.Op.general
BI	Yes	282	Class 0	Yes	46 (1) Enable Signal For Current Multiplier		LD0.NSPTOC1.InEnaMult.stVal

Table 30: 46 (2):Negative-sequence overcurrent protection - instance 2 (NSPTOC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		283	Class 1 and 0	Yes	46 (2) Trip (Operate)		LD0.NSPTOC2.Op.general
BI	Yes	284	Class 0	Yes	46 (2) Enable Signal For Current Multiplier		LD0.NSPTOC2.InEnaMult.stVal

Table 31: 59G (2):Residual overvoltage protection - instance 1 (ROVPTOV1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		257	Class 1 and 0	Yes	59G (2) Trip (Operate)		LD0.ROVPTOV1.Op.general

Table 32: 59N (2):Residual overvoltage protection - instance 2 (ROVPTOV2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		258	Class 1 and 0	Yes	59N (2) Trip (Operate)		LD0.ROVPTOV2.Op.general

Table 33: 59N (1):Residual overvoltage protection - instance 3 (ROVPTOV3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		259	Class 1 and 0	Yes	59N (1) Trip (Operate)		LD0.ROVPTOV3.Op.general

Table 34: 59G (1):Residual overvoltage protection - instance 4 (ROVPTOV4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		260	Class 1 and 0	Yes	59G (1) Trip (Operate)		LD0.ROVPTOV4.Op.general

Table 35: 27 (2):Three-phase undervoltage protection - instance 1 (PHPTUV1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		273	Class 1 and 0	Yes	27 (2) Trip (Operate)		LD0.PHPTUV1.Op.general
BI		274	Class 1 and 0	Yes	27 (2) Phase A Trip (Operate)		LD0.PHPTUV1.Op.phsA
BI		275	Class 1 and 0	Yes	27 (2) Phase B Trip (Operate)		LD0.PHPTUV1.Op.phsB
BI		276	Class 1 and 0	Yes	27 (2) Phase C Trip (Operate)		LD0.PHPTUV1.Op.phsC

Table 36: 27 (1):Three-phase undervoltage protection - instance 2 (PHPTUV2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		277	Class 1 and 0	Yes	27 (1) Trip (Operate)		LD0.PHPTUV2.Op.general
BI		278	Class 1 and 0	Yes	27 (1) Phase A Trip (Operate)		LD0.PHPTUV2.Op.phsA
BI		279	Class 1 and 0	Yes	27 (1) Phase B Trip (Operate)		LD0.PHPTUV2.Op.phsB
BI		280	Class 1 and 0	Yes	27 (1) Phase C Trip (Operate)		LD0.PHPTUV2.Op.phsC

Table 37: 59 (2):Three-phase overvoltage protection - instance 1 (PHPTOV1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		265	Class 1 and 0	Yes	59 (2) Trip (Operate)		LD0.PHPTOV1.Op.general
BI		266	Class 1 and 0	Yes	59 (2) Phase A Trip (Operate)		LD0.PHPTOV1.Op.phsA
BI		267	Class 1 and 0	Yes	59 (2) Phase B Trip (Operate)		LD0.PHPTOV1.Op.phsB
BI		268	Class 1 and 0	Yes	59 (2) Phase C Trip (Operate)		LD0.PHPTOV1.Op.phsC

Table 38: 59 (1):Three-phase overvoltage protection - instance 2 (PHPTOV2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		269	Class 1 and 0	Yes	59 (1) Trip (Operate)		LD0.PHPTOV2.Op.general
BI		270	Class 1 and 0	Yes	59 (1) Phase A Trip (Operate)		LD0.PHPTOV2.Op.phsA
BI		271	Class 1 and 0	Yes	59 (1) Phase B Trip (Operate)		LD0.PHPTOV2.Op.phsB
BI		272	Class 1 and 0	Yes	59 (1) Phase C Trip (Operate)		LD0.PHPTOV2.Op.phsC

Table 39: 47 (2):Negative-sequence overvoltage protection - instance 1 (NSPTOV1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		261	Class 1 and 0	Yes	47 (2) Trip (Operate)		LD0.NSPTOV1.Op.general

Table 40: 47 (1):Negative-sequence overvoltage protection - instance 2 (NSPTOV2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		262	Class 1 and 0	Yes	47 (1) Trip (Operate)		LD0.NSPTOV2.Op.general

Table 41: 81-1 (2):Frequency protection - instance 1 (FRPTRC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	349	Class 0	Yes	81-1 (2) Frequency Trip (Operate)		LD0.FRPTRC1.Op.general
AI	Yes	202	Class 0	Yes	81-1 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Instance	100	LD0.FRPTRC1.StrDur.mag.f

Table 42: 81-1 (2):Frequency protection - instance 1 (FRPTOF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		350	Class 1 and 0	Yes	81-1 (2) Over-Frequency Trip (Operate)		LD0.FRPTOF1.Op.general
AI	Yes	203	Class 0	Yes	81-1 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Overfrequency Instance	100	LD0.FRPTOF1.StrDur.mag.f

Table 43: 81-1 (2):Frequency protection - instance 1 (FRPTUF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		351	Class 1 and 0	Yes	81-1 (2) Under-Frequency Trip (Operate)		LD0.FRPTUF1.Op.general
AI	Yes	204	Class 0	Yes	81-1 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Underfrequency Instance	100	LD0.FRPTUF1.StrDur.mag.f

Table 44: 81-1 (2):Frequency protection - instance 1 (FRPFR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		352	Class 1 and 0	Yes	81-1 (2) Frequency Gradient Trip (Operate)		LD0.FRPFR1.Op.general
AI	Yes	205	Class 0	Yes	81-1 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Frequency Gradient Instance	100	LD0.FRPFR1.StrDur.mag.f

Table 45: 81-2 (2):Frequency protection - instance 2 (FRPTRC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	353	Class 0	Yes	81-2 (2) Frequency Trip (Operate)		LD0.FRPTRC2.Op.general
AI	Yes	206	Class 0	Yes	81-2 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Instance 2	100	LD0.FRPTRC2.StrDur.mag.f

Table 46: 81-2 (2):Frequency protection - instance 2 (FRPTOF2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		354	Class 1 and 0	Yes	81-2 (2) Over-Frequency Trip (Operate)		LD0.FRPTOF2.Op.general
AI	Yes	207	Class 0	Yes	81-2 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Overfrequency Instance	100	LD0.FRPTOF2.StrDur.mag.f

Table 47: 81-2 (2):Frequency protection - instance 2 (FRPTOF2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		354	Class 1 and 0	Yes	81-2 (2) Over-Frequency Trip (Operate)		LD0.FRPTOF2.Op.general
AI	Yes	207	Class 0	Yes	81-2 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Overfrequency Instance	100	LD0.FRPTOF2.StrDur.mag.f

Table 48: 81-2 (2):Frequency protection - instance 2 (FRPTUF2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		355	Class 1 and 0	Yes	81-2 (2) Under-Frequency Trip (Operate)		LD0.FRPTUF2.Op.general
AI	Yes	208	Class 0	Yes	81-2 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Underfrequency Instance	100	LD0.FRPTUF2.StrDur.mag.f

Table 49: 81-2 (2):Frequency protection - instance 2 (FRPFRC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		356	Class 1 and 0	Yes	81-2 (2) Frequency Gradient Trip (Operate)		LD0.FRPFRC2.Op.general
AI	Yes	209	Class 0	Yes	81-2 (2) Ratio Of Pickup (Start) Time / Trip (Operate) Time Frequency Gradient Instance	100	LD0.FRPFRC2.StrDur.mag.f

Table 50: 81-1 (1):Frequency protection - instance 3 (FRPTRC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	357	Class 0	Yes	81-1 (1) Trip (Operate)		LD0.FRPTRC3.Op.general
AI	Yes	210	Class 0	Yes	81-1 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time	100	LD0.FRPTRC3.StrDur.mag.f

Table 51: 81-1 (1):Frequency protection - instance 3 (FRPTOF3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		358	Class 1 and 0	Yes	81-1 (1) Over-Frequency Trip (Operate)		LD0.FRPTOF3.Op.general
AI	Yes	211	Class 0	Yes	81-1 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Overfrequency	100	LD0.FRPTOF3.StrDur.mag.f

Table 52: 81-1 (1):Frequency protection - instance 3 (FRPTUF3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		359	Class 1 and 0	Yes	81-1 (1) Under-Frequency Trip (Operate)		LD0.FRPTUF3.Op.general
AI	Yes	212	Class 0	Yes	81-1 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Underfrequency	100	LD0.FRPTUF3.StrDur.mag.f

Table 53: 81-1 (1):Frequency protection - instance 3 (FRPTUF3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		359	Class 1 and 0	Yes	81-1 (1) Under-Frequency Trip (Operate)		LD0.FRPTUF3.Op.general
AI	Yes	212	Class 0	Yes	81-1 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Underfrequency	100	LD0.FRPTUF3.StrDur.mag.f

Table 54: 81-1 (1):Frequency protection - instance 3 (FRPFRC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		360	Class 1 and 0	Yes	81-1 (1) Frequency Gradient Trip (Operate)		LD0.FRPFRC3.Op.general
AI	Yes	213	Class 0	Yes	81-1 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Frequency Gradient	100	LD0.FRPFRC3.StrDur.mag.f

Table 55: 81-2 (1):Frequency protection - instance 4 (FRPTRC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	361	Class 0	Yes	81-2 (1) Trip (Operate)		LD0.FRPTRC4.Op.general
AI	Yes	214	Class 0	Yes	81-2 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time	100	LD0.FRPTRC4.StrDur.mag.f

Table 56: 81-2 (1):Frequency protection - instance 4 (FRPTOF4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		362	Class 1 and 0	Yes	81-2 (1) Over-Frequency Trip (Operate)		LD0.FRPTOF4.Op.general
AI	Yes	215	Class 0	Yes	81-2 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Overfrequency	100	LD0.FRPTOF4.StrDur.mag.f

Table 57: 81-2 (1):Frequency protection - instance 4 (FRPTUF4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		363	Class 1 and 0	Yes	81-2 (1) Under-Frequency Trip (Operate)		LD0.FRPTUF4.Op.general
AI	Yes	216	Class 0	Yes	81-2 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Underfrequency	100	LD0.FRPTUF4.StrDur.mag.f

Table 58: 81-2 (1):Frequency protection - instance 4 (FRPFRC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		364	Class 1 and 0	Yes	81-2 (1) Frequency Gradient Trip (Operate)		LD0.FRPFRC4.Op.general
AI	Yes	217	Class 0	Yes	81-2 (1) Ratio Of Pickup (Start) Time / Trip (Operate) Time Frequency Gradient	100	LD0.FRPFRC4.StrDur.mag.f

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Table 59: 24-1 (2):Voltage per hertz protection - instance 1 (OEPVPH1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		558	Class 1 and 0	Yes	24-1 (2) Trip (Operate)		LD0.OEPVPH1.Op.general

Table 60: 24-2 (2):Voltage per hertz protection - instance 2 (OEPVPH2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		559	Class 1 and 0	Yes	24-2 (2) Trip (Operate)		LD0.OEPVPH2.Op.general

Table 61: 24-1 (1):Voltage per hertz protection - instance 3 (OEPVPH3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		560	Class 1 and 0	Yes	24-1 (1) Trip (Operate)		LD0.OEPVPH3.Op.general

Table 62: 24-2 (1):Voltage per hertz protection - instance 4 (OEPVPH4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		561	Class 1 and 0	Yes	24-2 (1) Trip (Operate)		LD0.OEPVPH4.Op.general

Table 63: 49T (1):Three-phase thermal overload protection for power transformers - two time constants (T2PTTR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		229	Class 1 and 0	Yes	49T (1) Thermal Overload Protection Alarm For Power Transformers		LD0.T2PTTR1.AlmThm.general
BI		230	Class 1 and 0	Yes	49T (1) Thermal Overload Protection Trip (Operate) For Power Transformers		LD0.T2PTTR1.Op.general
BI	Yes	617	Class 0	Yes	49T (1) temperature reset status		LD0.T2PTTR1.RsTmp.stVal
AI		186	Class 2 and 0	Yes	49T (1) Temp	100	LD0.T2PTTR1.Tmp.mag.f
AI		187	Class 2 and 0	Yes	49T (1) Temp_RI	100	LD0.T2PTTR1.TmpRI.mag.f
AI		188	Class 2 and 0	Yes	49T (1) The Ambient Temperature Used In The Calculation	100	LD0.T2PTTR1.TmpUsed.mag.f
AI	Yes	189	Class 0	Yes	49T (1) Estimated Time To Trip (Operate)	0	LD0.T2PTTR1.TmsOp.stVal
AI	Yes	190	Class 0	Yes	49T (1) Estimated Time To Deactivate Inhrec	0	LD0.T2PTTR1.TmsRecEna.stVal

Table 64: 87T:Restrained (low stage) and unrestrained (high stage) differential protection for 2W-transformers (TR2PDIF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		340	Class 1 and 0	Yes	87T Trip (Operate) Signal		LD0.TR2PDIF1.Op.general
BI		341	Class 1 and 0	Yes	87T Phase-A Differential Trip (Operate)		LD0.TR2PDIF1.Op.phsA
BI		342	Class 1 and 0	Yes	87T Phase-B Differential Trip (Operate)		LD0.TR2PDIF1.Op.phsB
BI		343	Class 1 and 0	Yes	87T Phase-C Differential Trip (Operate)		LD0.TR2PDIF1.Op.phsC

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		344	Class 1 and 0	Yes	87T Status From 2nd Harmonic Restraint Blocking- General		LD0.TR2PDIF1.Blk2HSt.general
BI		345	Class 1 and 0	Yes	87T Status From 2nd Harmonic Restraint Blocking- Phase A		LD0.TR2PDIF1.Blk2HSt.phsA
BI		346	Class 1 and 0	Yes	87T Status From 2nd Harmonic Restraint Blocking- Phase B		LD0.TR2PDIF1.Blk2HSt.phsB
BI		347	Class 1 and 0	Yes	87T Status From 2nd Harmonic Restraint Blocking- Phase C		LD0.TR2PDIF1.Blk2HSt.phsC
AI	Yes	196	Class 0	Yes	87T Phase A Differential Current	100	LD0.TR2PDIF1.DifAClc.phsA.cVal.mag.f
AI	Yes	197	Class 0	Yes	87T Phase B Differential Current	100	LD0.TR2PDIF1.DifAClc.phsB.cVal.mag.f
AI	Yes	198	Class 0	Yes	87T Phase C Differential Current	100	LD0.TR2PDIF1.DifAClc.phsC.cVal.mag.f
AI	Yes	199	Class 0	Yes	87T Phase A Biasing Current	100	LD0.TR2PDIF1.RstA.phsA.cVal.mag.f
AI	Yes	200	Class 0	Yes	87T Phase B Biasing Current	100	LD0.TR2PDIF1.RstA.phsB.cVal.mag.f
AI	Yes	201	Class 0	Yes	87T Phase C Biasing Current	100	LD0.TR2PDIF1.RstA.phsC.cVal.mag.f

Table 65: 87LOZREF (2);Low impedance restricted ground-fault protection (LREFPDIF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		348	Class 1 and 0	Yes	87LOZREF (2) Trip (Operate)		LD0.LREFPDIF1.Op.general

Table 66: 50BF (1);Circuit breaker failure protection - instance 1 (CCBRBRF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		231	Class 1 and 0	Yes	50BF (1) Breaker External Operation Failure		LD0.CCBRBRF1.OpEx.general
BI		232	Class 1 and 0	Yes	50BF (1) Breaker Retrip (Internal Trip)		LD0.CCBRBRF1.OpIn.general
BI	Yes	233	Class 0	Yes	50BF (1) Breaker Trip Start		LD0.CCBRBRF1.InStr.stVal
BI	Yes	234	Class 0	Yes	50BF (1) Breaker Close Position		LD0.CCBRBRF1.InPosCls.stVal
BI	Yes	235	Class 0	Yes	50BF (1) Breaker Faulty And Unable To Trip		LD0.CCBRBRF1.InCBFit.stVal

Table 67: 50BF (2);Circuit breaker failure protection - instance 2 (CCBRBRF2)*

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		236	Class 1 and 0	Yes	50BF (2) Breaker External Operation Failure		LD0.CCBRBRF2.OpEx.general
BI		237	Class 1 and 0	Yes	50BF (2) Breaker Retrip (Internal Trip)		LD0.CCBRBRF2.OpIn.general

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DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	238	Class 0	Yes	50BF (2) Breaker Trip Start		LD0.CCBBRBF2.InStr.stVal
BI	Yes	239	Class 0	Yes	50BF (2) Breaker Close Position		LD0.CCBBRBF2.InPosCls.stVal
BI	Yes	240	Class 0	Yes	50BF (2) Breaker Faulty And Unable To Trip		LD0.CCBBRBF2.InCBFlt.stVal

Table 68: 86/94-1:Master trip - instance 1 (TRPPTRC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		7	Class 1 and 0	Yes	86/94-1 Master Trip General Output 1		LD0.TRPPTRC1.Tr.general
BI		8	Class 1 and 0	Yes	86/94-1 Master Trip Trip (Operate) Input 1		LD0.TRPPTRC1.Op.general
BI	Yes	605	Class 0	Yes	86/94-1 Reset trip Lockout		LD0.TRPPTRC1.LORs.stVal
BI		606	Class 1 and 0	Yes	86/94-1 Reset latched trip		LD0.TRPPTRC1.TrRs.stVal

Table 69: 86/94-2:Master trip - instance 2 (TRPPTRC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		9	Class 1 and 0	Yes	86/94-2 Master Trip General Output 2		LD0.TRPPTRC2.Tr.general
BI		10	Class 1 and 0	Yes	86/94-2 Master Trip Trip (Operate) Input 2		LD0.TRPPTRC2.Op.general
BI	Yes	607	Class 0	Yes	86/94-2 Reset trip lockout		LD0.TRPPTRC2.LORs.stVal
BI		608	Class 1 and 0	Yes	86/94-2 Reset latched trip		LD0.TRPPTRC2.TrRs.stVal

Table 70: AFD-1 (2):Arc protection - instance 1 (ARCSARC11)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		286	Class 1 and 0	Yes	AFD-1 Fault Arc Detected 1		LD0.ARCSARC11.FADet.stVal
BI	Yes	287	Class 0	Yes	AFD-1 Remote Fault Arc Detected 1		LD0.ARCSARC11.InRemFA.stVal

Table 71: AFD-1 (2):Arc protection - instance 1 (ARCPTRC11)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		288	Class 1 and 0	Yes	AFD-1 Arc Detected Trip (Operate) 1		LD0.ARCPTRC11.Op.general

Table 72: AFD-2 (2):Arc protection - instance 2 (ARCSARC21)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		289	Class 1 and 0	Yes	AFD-2 Fault Arc Detected 2		LD0.ARCSARC21.FADet.stVal
BI	Yes	290	Class 0	Yes	AFD-2 Remote Fault Arc Detected 2		LD0.ARCSARC21.InRemFA.stVal

Table 73: AFD-2 (2):Arc protection - instance 2 (ARCPTRC21)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		291	Class 1 and 0	Yes	AFD-2 Arc Detected Trip (Operate) 2		LD0.ARCPTRC21.Op.general

Table 74: AFD-3 (2):Arc protection - instance 3 (ARCSARC31)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		292	Class 1 and 0	Yes	AFD-3 Fault Arc Detected 3		LD0.ARCSARC31.FADet.stVal
BI	Yes	293	Class 0	Yes	AFD-3 Remote Fault Arc Detected 3		LD0.ARCSARC31.InRemFA.stVal

Table 75: AFD-3 (2):Arc protection - instance 3 (ARCPTRC31)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		294	Class 1 and 0	Yes	AFD-3 Arc Detected Trip (Operate) 3		LD0.ARCPTRC31.Op.general

Table 76: MAP - 1 :Multi-purpose protection - instance 1 (MAPGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		386	Class 1 and 0	Yes	MAP - 1 Multi-Purpose Protection 1		LD0.MAPGAPC1.Op.general

Table 77: MAP -2:Multi-purpose protection - instance 2 (MAPGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		387	Class 1 and 0	Yes	MAP -2 Multi-Purpose Protection 2		LD0.MAPGAPC2.Op.general

Table 78: MAP - 3:Multi-purpose protection - instance 3 (MAPGAPC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		388	Class 1 and 0	Yes	MAP - 3 Multi-Purpose Protection 3		LD0.MAPGAPC3.Op.general

Table 79: 81LSH-1 (2):Load shedding and restoration - instance 1 (LSHDPTRC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		365	Class 1 and 0	Yes	81LSH-1 (2) Load Shedding Trip		LD0.LSHDPTRC1.Op.general
BI		366	Class 1 and 0	Yes	81LSH-1 (2) Restore Signal For Load Restoring Purposes		LD0.LSHDPTRC1.RestLodOp.general
AI	Yes	218	Class 0	Yes	81LSH-1 (2) Ratio Of Pickup (Start) / Trip (Operate) Time Frequency Gradient	100	LD0.LSHDPTRC1.StrDur.mag.f

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Table 80: 81LSH-1 (2):Load shedding and restoration - instance 1 (LSHDPTUF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	367	Class 0	Yes	81LSH-1 (2) Trip (Operate) Underfrequency		LD0.LSHDPTUF1.Op.general

Table 81: 81LSH-1 (2):Load shedding and restoration - instance 1 (LSHDPFRC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	368	Class 0	Yes	81LSH-1 (2) Trip (Operate) Frequency Gradient		LD0.LSHDPFRC1.Op.general

Table 82: 81LSH-2 (2):Load shedding and restoration - instance 2 (LSHDPTRC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		369	Class 1 and 0	Yes	81LSH-2 (2) Load Shedding Trip		LD0.LSHDPTRC2.Op.general
BI		370	Class 1 and 0	Yes	81LSH-2 (2) Restore Signal For Load Restoring Purposes		LD0.LSHDPTRC2.RestLodOp.general
AI	Yes	219	Class 0	Yes	81LSH-2 (2) Ratio Of Pickup (Start) / Trip (Operate) Time Frequency Gradient	100	LD0.LSHDPTRC2.StrDur.mag.f

Table 83: 81LSH-2 (2):Load shedding and restoration - instance 2 (LSHDPTUF2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	371	Class 0	Yes	81LSH-2 (2) Trip (Operate) Underfrequency		LD0.LSHDPTUF2.Op.general

Table 84: 81LSH-2 (2):Load shedding and restoration - instance 2 (LSHDPFRC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	372	Class 0	Yes	81LSH-2 (2) Trip (Operate) Frequency Gradient		LD0.LSHDPFRC2.Op.general

Table 85: 81LSH-1 (1):Load shedding and restoration - instance 3 (LSHDPTRC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		373	Class 1 and 0	Yes	81LSH-1 (1) Load Shedding Trip		LD0.LSHDPTRC3.Op.general
BI		374	Class 1 and 0	Yes	81LSH-1 (1) Restore Signal For Load Restoring Purposes		LD0.LSHDPTRC3.RestLodOp.general
AI	Yes	220	Class 0	Yes	81LSH-1 (1) Ratio Of Pickup (Start) / Trip (Operate) Time Frequency Gradient	100	LD0.LSHDPTRC3.StrDur.mag.f

Table 86: 81LSH-1 (1):Load shedding and restoration - instance 3 (LSHDPTUF3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	375	Class 0	Yes	81LSH-1 (1) Trip (Operate) Underfrequency		LD0.LSHDPTUF3.Op.general

Table 87: 81LSH-1 (1):Load shedding and restoration - instance 3 (LSHDPFRC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	376	Class 0	Yes	81LSH-1 (1) Trip (Operate) Frequency Gradient		LD0.LSHDPFRC3.Op.general

Table 88: 81LSH-2 (1):Load shedding and restoration - instance 4 (LSHDPTRC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		377	Class 1 and 0	Yes	81LSH-2 (1)Load Shedding Trip		LD0.LSHDPTRC4.Op.general
BI		378	Class 1 and 0	Yes	81LSH-2 (1) Restore Signal For Load Restoring Purposes		LD0.LSHDPTRC4.RestLodOp.general
AI	Yes	221	Class 0	Yes	81LSH-2 (1) Ratio Of Pickup (Start) / Trip (Operate) Time Frequency Gradient	100	LD0.LSHDPTRC4.StrDur.mag.f

Table 89: 81LSH-2 (1):Load shedding and restoration - instance 4 (LSHDPTUF4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	379	Class 0	Yes	81LSH-2 (1) Trip (Operate) Underfrequency		LD0.LSHDPTUF4.Op.general

Table 90: 81LSH-2 (1):Load shedding and restoration - instance 4 (LSHDPFRC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	380	Class 0	Yes	81LSH-2 (1) Trip (Operate) Frequency Gradient		LD0.LSHDPFRC4.Op.general

Table 91: 37 (1):Loss of phase - instance 1 (PHPTUC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		542	Class 1 and 0	Yes	37 (1) Trip (Operate)		LD0.PHPTUC1.Op.general
BI		543	Class 1 and 0	Yes	37 (1) Phase-A Trip (Operate)		LD0.PHPTUC1.Op.phsA
BI		544	Class 1 and 0	Yes	37 (1) Phase-B Trip (Operate)		LD0.PHPTUC1.Op.phsB
BI		545	Class 1 and 0	Yes	37 (1) Phase-C Trip (Operate)		LD0.PHPTUC1.Op.phsC

Table 92: 52 (1):Circuit-breaker control - instance 1 (CBCILO1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		589	Class 1 and 0	Yes	52 (1) Breaker Interlock Enable Open 1		CTRL.CBCILO1.EnaOpn.stVal
BI		590	Class 1 and 0	Yes	52 (1) Breaker Interlock Enable Close 1		CTRL.CBCILO1.EnaCls.stVal
BI		591	Class 1 and 0	Yes	52 (1) Breaker Interlock Bypass 1		CTRL.CBCILO1.ItlByPss.stVal

Table 93: 52 (1):Circuit-breaker control - instance 1 (CBCSW1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	592	Class 0	Yes	52 (1) Breaker Switch Position Open		CTRL.CBCSW11.PosOpn.stVal
BI	Yes	593	Class 0	Yes	52 (1) Breaker Switch Position Closed		CTRL.CBCSW11.PosCls.stVal
BI	Yes	594	Class 0	Yes	52 (1) Breaker Switch Position valid		CTRL.CBCSW11.PosOk.stVal
AI		398	Class 2 and 0	Yes	52 (1) Breaker Switch Position 1	0	CTRL.CBCSW11.Pos.stVal

Table 94: 52 (1):Circuit-breaker control - instance 1 (CBXCBR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		630	Class 1 and 0	Yes	52 (1) Breaker Block Open		CTRL.CBXCBR1.BlkOpn.stVal
BI		631	Class 1 and 0	Yes	52 (1) Breaker Block Close		CTRL.CBXCBR1.BlkCls.stVal

Table 95: 52 (2):Circuit-breaker control - instance 2 (CBCILO2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		595	Class 1 and 0	Yes	52 (2) Breaker Interlock Enable Open 2		CTRL.CBCILO2.EnaOpn.stVal
BI		596	Class 1 and 0	Yes	52 (2) Breaker Interlock Enable Close 2		CTRL.CBCILO2.EnaCls.stVal
BI		597	Class 1 and 0	Yes	52 (2) Breaker Interlock Bypass 2		CTRL.CBCILO2.ItlByPss.stVal

Table 96: 52 (2):Circuit-breaker control - instance 2 (CBCSWI2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	598	Class 0	Yes	52 (2) Breaker Switch Position Open		CTRL.CBCSWI2.PosOpn.stVal
BI	Yes	599	Class 0	Yes	52 (2) Breaker Switch Position Closed		CTRL.CBCSWI2.PosCls.stVal
BI	Yes	600	Class 0	Yes	52 (2) Breaker Switch Position valid		CTRL.CBCSWI2.PosOk.stVal
AI		399	Class 2 and 0	Yes	52 (2) Recloser Switch Position 2	0	CTRL.CBCSWI2.Pos.stVal

Table 97: 52 (2):Circuit-breaker control - instance 2 (CBXCBR2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		632	Class 1 and 0	Yes	52 (2) Breaker Block Open		CTRL.CBXCBR2.BlkOpn.stVal
BI		633	Class 1 and 0	Yes	52 (2) Breaker Block Close		CTRL.CBXCBR2.BlkCls.stVal

Table 98: 84T:Tap changer position indication (TPOSSLTC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		115	Class 2 and 0	Yes	84T TAPPOS	0	LD0.TPOSSLTC1.TapPos.valW Tr.posVal

Table 99: 52CM (1):Circuit-breaker condition monitoring - instance 1 (SSCBR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	11	Class 0	Yes	52CM (1) Recloser Spring Charging Started Input		LD0.SSCBR1.InSprChStr.stVal
BI	Yes	12	Class 0	Yes	52CM (1) Recloser Spring Charged Input		LD0.SSCBR1.InSprCha.stVal
BI	Yes	13	Class 0	Yes	52CM (1) Binary Pressure Input For Alarm		LD0.SSCBR1.InPresAlm.stVal
BI	Yes	14	Class 0	Yes	52CM (1) Binary Pressure Input For Lockout Indication		LD0.SSCBR1.InPresLO.stVal
BI	Yes	15	Class 0	Yes	52CM (1) Posopen		LD0.SSCBR1.InPosOpn.stVal
BI	Yes	16	Class 0	Yes	52CM (1) Posclose		LD0.SSCBR1.InPosCls.stVal
BI		17	Class 1 and 0	Yes	52CM (1) Recloser Open Travel Time Exceeded Set Value		LD0.SSCBR1.OpnAlm.stVal
BI		18	Class 1 and 0	Yes	52CM (1) Recloser Close Travel Time Exceeded Set Value		LD0.SSCBR1.ClsAlm.stVal
BI		19	Class 1 and 0	Yes	52CM (1) Spring Charging Time Has Crossed The Set Value		LD0.SSCBR1.SprChaAlm.stVal
BI		20	Class 1 and 0	Yes	52CM (1) Number Of Recloser Operations Exceeds Alarm Limit		LD0.SSCBR1.OpNumAlm.stVal
BI		21	Class 1 and 0	Yes	52CM (1) Number Of Recloser Operations Exceeds Lockout Limit		LD0.SSCBR1.OpNumLO.stVal
BI		22	Class 1 and 0	Yes	52CM (1) Recloser Not Operated For Long Time Alarm		LD0.SSCBR1.LonTmAlm.stVal
BI		23	Class 1 and 0	Yes	52CM (1) Pressure Below Alarm Level		LD0.SSCBR1.PresAlm.stVal
BI		24	Class 1 and 0	Yes	52CM (1) Pressure Below Lockout Level		LD0.SSCBR1.PresLO.stVal
BI	Yes	25	Class 0	Yes	52CM (1) Recloser Position Is Open		LD0.SSCBR1.PosOpn.stVal
BI	Yes	26	Class 0	Yes	52CM (1) Invalid Position		LD0.SSCBR1.PosIvd.stVal
BI	Yes	27	Class 0	Yes	52CM (1) Recloser Position Is Closed		LD0.SSCBR1.PosCls.stVal
BI	Yes	28	Class 0	Yes	52CM (1) Reset Accumulation Energy		LD0.SSCBR1.RsAccAPwr.stVal
BI	Yes	29	Class 0	Yes	52CM (1) Reset Input For Recloser Remaining Life And Operation Counter		LD0.SSCBR1.RsCBWear.stVal
BI	Yes	30	Class 0	Yes	52CM (1) Reset Travel T		LD0.SSCBR1.RsTrvTm.stVal
BI	Yes	31	Class 0	Yes	52CM (1) Reset Spr.Charge T		LD0.SSCBR1.RsSprChaTm.stVal
BI		32	Class 1 and 0	Yes	52CM (1) Accumulated Currents Power (lyt) Exceeded Alarm Limit		LD0.SSCBR1.APwrAlm.stVal
BI		33	Class 1 and 0	Yes	52CM (1) Accumulated Currents Power (lyt) Exceeded Lockout Limit		LD0.SSCBR1.APwrLO.stVal
BI		34	Class 1 and 0	Yes	52CM (1) Remaining Life Of Recloser Exceeded Alarm Limit		LD0.SSCBR1.CBLifAlm.stVal
AI	Yes	5	Class 0	Yes	52CM (1) The Number Of Days Recloser Has Been Inactive	0	LD0.SSCBR1.InaTmdCnt.stVal
AI	Yes	6	Class 0	Yes	52CM (1) Travel Time Of The Recloser During Opening Operation	100	LD0.SSCBR1.TmmsOpn.mag.f
AI	Yes	7	Class 0	Yes	52CM (1) Travel Time Of The Recloser During Closing Operation	100	LD0.SSCBR1.TmmsCls.mag.f
AI	Yes	8	Class 0	Yes	52CM (1) The Charging Time Of The Recloser Spring	100	LD0.SSCBR1.TmsSprCha.mag.f

Section 2 DNP3 data mappings

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI	Yes	9	Class 0	Yes	52CM (1) Phase A Recloser Monitoring Remaining Life	0	LD0.SSCBR1.RmnLifPhA.stVal
AI	Yes	10	Class 0	Yes	52CM (1) Phase B Recloser Monitoring Remaining Life	0	LD0.SSCBR1.RmnLifPhB.stVal
AI	Yes	11	Class 0	Yes	52CM (1) Phase C Recloser Monitoring Remaining Life	0	LD0.SSCBR1.RmnLifPhC.stVal
AI	Yes	12	Class 0	Yes	52CM (1) Phase A Accumulated Currents Power (Iyt)	100	LD0.SSCBR1.AccAPwrPhA.maf
AI	Yes	13	Class 0	Yes	52CM (1) Phase B Accumulated Currents Power (Iyt)	100	LD0.SSCBR1.AccAPwrPhB.maf
AI	Yes	14	Class 0	Yes	52CM (1) Phase C Accumulated Currents Power (Iyt)	100	LD0.SSCBR1.AccAPwrPhC.maf

Table 100: 52CM (2):Circuit-breaker condition monitoring - instance 2 (SSCBR2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	35	Class 0	Yes	52CM (2) Recloser Spring Charging Started Input		LD0.SSCBR2.InSprChStr.stVal
BI	Yes	36	Class 0	Yes	52CM (2) Recloser Spring Charged Input		LD0.SSCBR2.InSprCha.stVal
BI	Yes	37	Class 0	Yes	52CM (2) Binary Pressure Input For Alarm1		LD0.SSCBR2.InPresAlm.stVal
BI	Yes	38	Class 0	Yes	52CM (2) Binary Pressure Input For Lockout Indication		LD0.SSCBR2.InPresLO.stVal
BI	Yes	39	Class 0	Yes	52CM (2) Posopen		LD0.SSCBR2.InPosOpn.stVal
BI	Yes	40	Class 0	Yes	52CM (2) Posclose		LD0.SSCBR2.InPosCls.stVal
BI		41	Class 1 and 0	Yes	52CM (2) Recloser Open Travel Time Exceeded Set Value		LD0.SSCBR2.OpnAlm.stVal
BI		42	Class 1 and 0	Yes	52CM (2) Recloser Close Travel Time Exceeded Set Value		LD0.SSCBR2.ClsAlm.stVal
BI		43	Class 1 and 0	Yes	52CM (2) Spring Charging Time Has Crossed The Set Value		LD0.SSCBR2.SprChaAlm.stVal
BI		44	Class 1 and 0	Yes	52CM (2) Number Of Recloser Operations Exceeds Alarm Limit		LD0.SSCBR2.OpNumAlm.stVal
BI		45	Class 1 and 0	Yes	52CM (2) Number Of Recloser Operations Exceeds Lockout Limit		LD0.SSCBR2.OpNumLO.stVal
BI		46	Class 1 and 0	Yes	52CM (2) Recloser Not Operated For Long Time Alarm		LD0.SSCBR2.LonTmAlm.stVal
BI		47	Class 1 and 0	Yes	52CM (2) Pressure Below Alarm Level		LD0.SSCBR2.PresAlm.stVal
BI		48	Class 1 and 0	Yes	52CM (2) Pressure Below Lockout Level		LD0.SSCBR2.PresLO.stVal
BI	Yes	49	Class 0	Yes	52CM (2) Recloser Position Is Open		LD0.SSCBR2.PosOpn.stVal
BI	Yes	50	Class 0	Yes	52CM (2) Invalid Position		LD0.SSCBR2.Poslvd.stVal
BI	Yes	51	Class 0	Yes	52CM (2) Recloser Position Is Closed		LD0.SSCBR2.PosCls.stVal
BI		52	Class 1 and 0	Yes	52CM (2) Accumulated Currents Power (Iyt) Exceeded Alarm Limit		LD0.SSCBR2.APwrAlm.stVal
BI		53	Class 1 and 0	Yes	52CM (2) Accumulated Currents Power (Iyt) Exceeded Lockout Limit		LD0.SSCBR2.APwrLO.stVal

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		54	Class 1 and 0	Yes	52CM (2) Remaining Life Of Recloser Exceeded Alarm Limit		LD0.SSCBR2.CBLifAlm.stVal
BI	Yes	609	Class 0	Yes	52CM (2) Reset Accumulation Energy		LD0.SSCBR2.RsAccAPwr.stVal
BI	Yes	610	Class 0	Yes	52CM (2) Reset Input For Recloser Remaining Life And Operation Counter		LD0.SSCBR2.RsCBWear.stVal
BI	Yes	611	Class 0	Yes	52CM (2) Reset Travel T		LD0.SSCBR2.RsTrvTm.stVal
BI	Yes	612	Class 0	Yes	52CM (2) Reset Spr.Charge T		LD0.SSCBR2.RsSprChaTm.stVal
AI	Yes	15	Class 0	Yes	52CM (2) Travel Time Of The Recloser During Opening Operation	100	LD0.SSCBR2.TmmsOpn.mag.f
AI	Yes	16	Class 0	Yes	52CM (2) Travel Time Of The Recloser During Closing Operation	100	LD0.SSCBR2.TmmsCls.mag.f
AI	Yes	17	Class 0	Yes	52CM (2) The Charging Time Of The Recloser Spring	100	LD0.SSCBR2.TmsSprCha.mag.f
AI	Yes	18	Class 0	Yes	52CM (2) Phase A Recloser Monitoring Remaining Life	0	LD0.SSCBR2.RmnLifPhA.stVal
AI	Yes	19	Class 0	Yes	52CM (2) Phase B Recloser Monitoring Remaining Life	0	LD0.SSCBR2.RmnLifPhB.stVal
AI	Yes	20	Class 0	Yes	52CM (2) Phase C Recloser Monitoring Remaining Life	0	LD0.SSCBR2.RmnLifPhC.stVal
AI	Yes	21	Class 0	Yes	52CM (2) Phase A Accumulated Currents Power (lyt)	100	LD0.SSCBR2.AccAPwrPhA.mag.f
AI	Yes	22	Class 0	Yes	52CM (2) Phase B Accumulated Currents Power (lyt)	100	LD0.SSCBR2.AccAPwrPhB.mag.f
AI	Yes	23	Class 0	Yes	52CM (2) Phase C Accumulated Currents Power (lyt)	100	LD0.SSCBR2.AccAPwrPhC.mag.f

Table 101: TCM-1: Trip circuit supervision - instance 1 (TCSSCBR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		295	Class 1 and 0	Yes	TCM-1 Trip Circuit Supervision Alarm		LD0.TCSSCBR1.CirAlm.stVal

Table 102: TCM-2: Trip circuit supervision - instance 2 (TCSSCBR2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		296	Class 1 and 0	Yes	TCM-2 Trip Circuit Supervision Alarm		LD0.TCSSCBR2.CirAlm.stVal

Table 103: MCS 3I-I2: Advanced current circuit supervision for transformers (CTSRCTF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		579	Class 1 and 0	Yes	MCS 3I I2 Trip (Operate)		LD0.CTSRCTF1.Op.general
BI		580	Class 1 and 0	Yes	MCS 3I I2 Trip (Operate) Group 1		LD0.CTSRCTF1.OpGrp1.general
BI		581	Class 1 and 0	Yes	MCS 3I I2 Trip (Operate) Group 2		LD0.CTSRCTF1.OpGrp2.general
BI		582	Class 1 and 0	Yes	MCS 3I I2 Trip (Operate) Group 3		LD0.CTSRCTF1.OpGrp3.general

Section 2 DNP3 data mappings

Table 104: 60 (1):Fuse failure supervision - instance 1 (SEQRFUF1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		299	Class 1 and 0	Yes	60 (1) Three Phase Fuse Failure Supervision		LD0.SEQRFUF1.Str3Ph.general

Table 105: 60 (2):Fuse failure supervision - instance 2 (SEQRFUF2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		300	Class 1 and 0	Yes	60 (2) Three Phase Fuse Failure Supervision		LD0.SEQRFUF2.Str3Ph.general

Table 106: IA-IB-IC (1):Three-phase current measurement - instance 1 (CMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		161	Class 1 and 0	Yes	IA IB IC (1) Current Source High Alarm		LD0.CMMXU1.HiAlm.stVal
BI		162	Class 1 and 0	Yes	IA IB IC (1) Current Source High Warning		LD0.CMMXU1.HiWrn.stVal
BI		163	Class 1 and 0	Yes	IA IB IC (1) Current Source Low Warning		LD0.CMMXU1.LoWrn.stVal
BI		164	Class 1 and 0	Yes	IA IB IC (1) Current Source Low Alarm		LD0.CMMXU1.LoAlm.stVal
AI		42	Class 2 and 0	Yes	IA IB IC (1) Phase A Mag (RMS)	100	LD0.CMMXU1.A.phsA.instCVal.mag.f
AI		43	Class 2 and 0	Yes	IA IB IC (1) Phase A Mag (Deadbanded)	100	LD0.CMMXU1.A.phsA.cVal.mag.f
AI		44	Class 2 and 0	Yes	IA IB IC (1) Phase B Mag (RMS)	100	LD0.CMMXU1.A.phsB.instCVal.mag.f
AI		45	Class 2 and 0	Yes	IA IB IC (1) Phase B Mag (Deadbanded)	100	LD0.CMMXU1.A.phsB.cVal.mag.f
AI		46	Class 2 and 0	Yes	IA IB IC (1) Phase C Mag (RMS)	100	LD0.CMMXU1.A.phsC.instCVal.mag.f
AI		47	Class 2 and 0	Yes	IA IB IC (1) Phase C Mag (Deadbanded)	100	LD0.CMMXU1.A.phsC.cVal.mag.f

Table 107: IA-IB-IC (1):Three-phase current measurement - instance 1 (CMSTA1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	165	Class 0	Yes	IA IB IC (1) Reset Max Demands		LD0.CMSTA1.RecRs.stVal
AI	Yes	48	Class 0	Yes	IA IB IC (1) Phase A Average Demand	100	LD0.CMSTA1.AvAmpsA.mag.f
AI	Yes	49	Class 0	Yes	IA IB IC (1) Phase A Maximum Demand	100	LD0.CMSTA1.MaxAmpsA.mag.f
AI	Yes	50	Class 0	Yes	IA IB IC (1) Phase B Average Demand	100	LD0.CMSTA1.AvAmpsB.mag.f
AI	Yes	51	Class 0	Yes	IA IB IC (1) Phase B Maximum Demand	100	LD0.CMSTA1.MaxAmpsB.mag.f
AI	Yes	52	Class 0	Yes	IA IB IC (1) Phase C Average Demand	100	LD0.CMSTA1.AvAmpsC.mag.f
AI	Yes	53	Class 0	Yes	IA IB IC (1) Phase C Maximum Demand	100	LD0.CMSTA1.MaxAmpsC.mag.f

Table 108: IA-IB-IC (2):Three-phase current measurement - instance 2 (CMMXU2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		166	Class 1 and 0	Yes	IA IB IC (2) Current Source High Alarm		LD0.CMMXU2.HiAlm.stVal
BI		167	Class 1 and 0	Yes	IA IB IC (2) Current Source High Warning		LD0.CMMXU2.HiWrn.stVal
BI		168	Class 1 and 0	Yes	IA IB IC (2) Current Source Low Warning		LD0.CMMXU2.LoWrn.stVal
BI		169	Class 1 and 0	Yes	IA IB IC (2) Current Source Low Alarm		LD0.CMMXU2.LoAlm.stVal
AI		54	Class 2 and 0	Yes	IA IB IC (2) Phase A Mag (RMS)	100	LD0.CMMXU2.A.phsA.instCVal.mag.f
AI		55	Class 2 and 0	Yes	IA IB IC (2) Phase A Mag (Deadbanded)	100	LD0.CMMXU2.A.phsA.cVal.mag.f
AI		56	Class 2 and 0	Yes	IA IB IC (2) Phase B Mag (RMS)	100	LD0.CMMXU2.A.phsB.instCVal.mag.f
AI		57	Class 2 and 0	Yes	IA IB IC (2) Phase B Mag (Deadbanded)	100	LD0.CMMXU2.A.phsB.cVal.mag.f
AI		58	Class 2 and 0	Yes	IA IB IC (2) Phase C Mag (RMS)	100	LD0.CMMXU2.A.phsC.instCVal.mag.f
AI		59	Class 2 and 0	Yes	IA IB IC (2) Phase C Mag (Deadbanded)	100	LD0.CMMXU2.A.phsC.cVal.mag.f

Table 109: A-IB-IC (2):Three-phase current measurement - instance 2 (CMSTA2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	170	Class 0	Yes	IA IB IC (2) Reset Max Demands		LD0.CMSTA2.RecRs.stVal
AI	Yes	60	Class 0	Yes	IA IB IC (2) Phase A Average Demand	100	LD0.CMSTA2.AvAmpsA.mag.f
AI	Yes	61	Class 0	Yes	IA IB IC (2) Phase A Maximum Demand	100	LD0.CMSTA2.MaxAmpsA.mag.f
AI	Yes	62	Class 0	Yes	IA IB IC (2) Phase B Average Demand	100	LD0.CMSTA2.AvAmpsB.mag.f
AI	Yes	63	Class 0	Yes	IA IB IC (2) Phase B Maximum Demand	100	LD0.CMSTA2.MaxAmpsB.mag.f
AI	Yes	64	Class 0	Yes	IA IB IC (2) Phase C Average Demand	100	LD0.CMSTA2.AvAmpsC.mag.f
AI	Yes	65	Class 0	Yes	IA IB IC (2) Phase C Maximum Demand	100	LD0.CMSTA2.MaxAmpsC.mag.f

Table 110: I1-I2-I0 (1):Sequence current measurement - instance 1 (CSMSQ11)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		86	Class 2 and 0	Yes	I1-I2-I0 (1) Positive Sequence Magnitude (RMS)	100	LD0.CSMSQ11.SeqA.c1.instCVal.mag.f
AI		87	Class 2 and 0	Yes	I1-I2-I0 (1) Positive Sequence Magnitude (Deadband)	100	LD0.CSMSQ11.SeqA.c1.cVal.mag.f
AI		88	Class 2 and 0	Yes	I1-I2-I0 (1) Negative Sequence Magnitude (RMS)	100	LD0.CSMSQ11.SeqA.c2.instCVal.mag.f
AI		89	Class 2 and 0	Yes	I1-I2-I0 (1) Negative Sequence Magnitude (Deadband)	100	LD0.CSMSQ11.SeqA.c2.cVal.mag.f
AI		90	Class 2 and 0	Yes	I1-I2-I0 (1) Zero Sequence Magnitude (RMS)	100	LD0.CSMSQ11.SeqA.c3.instCVal.mag.f
AI		91	Class 2 and 0	Yes	I1-I2-I0 (1) Zero Sequence Magnitude (Deadband)	100	LD0.CSMSQ11.SeqA.c3.cVal.mag.f

Table 111: I1-I2-I0 (2):Sequence current measurement - instance 2 (CSMSQI2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		92	Class 2 and 0	Yes	I1-I2-I0 (2) Positive Sequence Magnitude (RMS)	100	LD0.CSMSQI2.SeqA.c1.instCVal.mag.f
AI		93	Class 2 and 0	Yes	I1-I2-I0 (2) Positive Sequence Magnitude (Deadband)	100	LD0.CSMSQI2.SeqA.c1.cVal.mag.f
AI		94	Class 2 and 0	Yes	I1-I2-I0 (2) Negative Sequence Magnitude (RMS)	100	LD0.CSMSQI2.SeqA.c2.instCVal.mag.f
AI		95	Class 2 and 0	Yes	I1-I2-I0 (2) Negative Sequence Magnitude (Deadband)	100	LD0.CSMSQI2.SeqA.c2.cVal.mag.f
AI		96	Class 2 and 0	Yes	I1-I2-I0 (2) Zero Sequence Magnitude (RMS)	100	LD0.CSMSQI2.SeqA.c3.instCVal.mag.f
AI		97	Class 2 and 0	Yes	I1-I2-I0 (2) Zero Sequence Magnitude (Deadband)	100	LD0.CSMSQI2.SeqA.c3.cVal.mag.f

Table 112: IG:Residual current measurement - instance 1 (RESCMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		171	Class 1 and 0	Yes	IG High Trip (Operate)		LD0.RESCMMXU1.HiAlm.stVal
BI		172	Class 1 and 0	Yes	IG High Warning		LD0.RESCMMXU1.HiWrn.stVal
AI		66	Class 2 and 0	Yes	IG Magnitude (RMS)	100	LD0.RESCMMXU1.A.res.instCVal.mag.f
AI		67	Class 2 and 0	Yes	IG Magnitude (deadbanded)	100	LD0.RESCMMXU1.A.res.cVal.mag.f

Table 113: VA-VB-VC (1):Three-phase voltage measurement - instance 1 (VMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		176	Class 1 and 0	Yes	VA VB VC (1) High Trip (Operate)		LD0.VMMXU1.HiAlm.stVal
BI		177	Class 1 and 0	Yes	VA VB VC (1) High Warning		LD0.VMMXU1.HiWrn.stVal
BI		178	Class 1 and 0	Yes	VA VB VC (1) Low Warning		LD0.VMMXU1.LoWrn.stVal
BI		179	Class 1 and 0	Yes	VA VB VC (1) Low Trip (Operate)		LD0.VMMXU1.LoAlm.stVal
AI		68	Class 2 and 0	Yes	VA VB VC (1) Phase A Mag	100	LD0.VMMXU1.PhV.phsA.cVal.mag.f
AI		69	Class 2 and 0	Yes	VA VB VC (1) Phase B Mag	100	LD0.VMMXU1.PhV.phsB.cVal.mag.f
AI		70	Class 2 and 0	Yes	VA VB VC (1) Phase C Mag	100	LD0.VMMXU1.PhV.phsC.cVal.mag.f
AI		71	Class 2 and 0	Yes	VA VB VC (1) Phase AB Mag (RMS)	100	LD0.VMMXU1.PPV.phsAB.instCVal.mag.f
AI		72	Class 2 and 0	Yes	VA VB VC (1) Phase AB Mag (Deadband)	100	LD0.VMMXU1.PPV.phsAB.cVal.mag.f
AI		73	Class 2 and 0	Yes	VA VB VC (1) Phase BC Mag (RMS)	100	LD0.VMMXU1.PPV.phsBC.instCVal.mag.f
AI		74	Class 2 and 0	Yes	VA VB VC (1) Phase BC Mag (Deadband)	100	LD0.VMMXU1.PPV.phsBC.cVal.mag.f

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		75	Class 2 and 0	Yes	VA VB VC (1) Phase CA Mag (RMS)	100	LD0.VMMXU1.PPV.phsCA.instCVal.mag.f
AI		76	Class 2 and 0	Yes	VA VB VC (1) Phase CA Mag (Deadband)	100	LD0.VMMXU1.PPV.phsCA.cVal.mag.f

Table 114: VA-VB-VC (2):Three-phase voltage measurement - instance 2 (VMMXU2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		180	Class 1 and 0	Yes	VA VB VC (2) High Trip (Operate)		LD0.VMMXU2.HiAlm.stVal
BI		181	Class 1 and 0	Yes	VA VB VC (2) High Warning		LD0.VMMXU2.HiWrn.stVal
BI		182	Class 1 and 0	Yes	VA VB VC (2) Low Warning		LD0.VMMXU2.LoWrn.stVal
BI		183	Class 1 and 0	Yes	VA VB VC (2) Low Trip (Operate)		LD0.VMMXU2.LoAlm.stVal
AI		77	Class 2 and 0	Yes	VA VB VC (2) Phase A Mag	100	LD0.VMMXU2.PhV.phsA.cVal.mag.f
AI		78	Class 2 and 0	Yes	VA VB VC (2) Phase B Mag	100	LD0.VMMXU2.PhV.phsB.cVal.mag.f
AI		79	Class 2 and 0	Yes	VA VB VC (2) Phase C Mag	100	LD0.VMMXU2.PhV.phsC.cVal.mag.f
AI		80	Class 2 and 0	Yes	VA VB VC (2) Phase AB Mag (RMS)	100	LD0.VMMXU2.PPV.phsAB.instCVal.mag.f
AI		81	Class 2 and 0	Yes	VA VB VC (2) Phase AB Mag (Deadband)	100	LD0.VMMXU2.PPV.phsAB.cVal.mag.f
AI		82	Class 2 and 0	Yes	VA VB VC (2) Phase BC Mag (RMS)	100	LD0.VMMXU2.PPV.phsBC.instCVal.mag.f
AI		83	Class 2 and 0	Yes	VA VB VC (2) Phase BC Mag (Deadband)	100	LD0.VMMXU2.PPV.phsBC.cVal.mag.f
AI		84	Class 2 and 0	Yes	VA VB VC (2) Phase CA Mag (RMS)	100	LD0.VMMXU2.PPV.phsCA.instCVal.mag.f
AI		85	Class 2 and 0	Yes	VA VB VC (2) Phase CA Mag (Deadband)	100	LD0.VMMXU2.PPV.phsCA.cVal.mag.f

Table 115: VG:Residual voltage measurement - instance 1 (RESVMMXU1))

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		174	Class 1 and 0	Yes	VG High Alarm		LD0.RESVMMXU1.HiAlm.stVal
BI		175	Class 1 and 0	Yes	VG High Warning		LD0.RESVMMXU1.HiWrn.stVal

Section 2 DNP3 data mappings

Table 116: V1-V2-V0 (1):Sequence voltage measurement - instance 1 (VSMSQI1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		98	Class 2 and 0	Yes	V1 V2 V0 (1) Positive Sequence Mag (RMS)	100	LD0.VSMSQI1.SeqV.c1.instCVal.mag.f
AI		99	Class 2 and 0	Yes	V1 V2 V0 (1) Positive Sequence Mag (Deadband)	100	LD0.VSMSQI1.SeqV.c1.cVal.mag.f
AI		100	Class 2 and 0	Yes	V1 V2 V0 (1) Negative Sequence Mag (RMS)	100	LD0.VSMSQI1.SeqV.c2.instCVal.mag.f
AI		101	Class 2 and 0	Yes	V1 V2 V0 (1) Negative Sequence Mag (Deadband)	100	LD0.VSMSQI1.SeqV.c2.cVal.mag.f
AI		102	Class 2 and 0	Yes	V1 V2 V0 (1) Zero Sequence Mag (RMS)	100	LD0.VSMSQI1.SeqV.c3.instCVal.mag.f
AI		103	Class 2 and 0	Yes	V1 V2 V0 (1) Zero Sequence Mag (Deadband)	100	LD0.VSMSQI1.SeqV.c3.cVal.mag.f

Table 117: V1-V2-V0 (2):Sequence voltage measurement - instance 2 (VSMSQI2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		104	Class 2 and 0	Yes	V1 V2 V0 (2) Positive Sequence Mag (RMS)	100	LD0.VSMSQI2.SeqV.c1.instCVal.mag.f
AI		105	Class 2 and 0	Yes	V1 V2 V0 (2) Positive Sequence Mag (Deadband)	100	LD0.VSMSQI2.SeqV.c1.cVal.mag.f
AI		106	Class 2 and 0	Yes	V1 V2 V0 (2) Negative Sequence Mag (RMS)	100	LD0.VSMSQI2.SeqV.c2.instCVal.mag.f
AI		107	Class 2 and 0	Yes	V1 V2 V0 (2) Negative Sequence Mag (Deadband)	100	LD0.VSMSQI2.SeqV.c2.cVal.mag.f
AI		108	Class 2 and 0	Yes	V1 V2 V0 (2) Zero Sequence Mag (RMS)	100	LD0.VSMSQI2.SeqV.c3.instCVal.mag.f
AI		109	Class 2 and 0	Yes	V1 V2 V0 (2) Zero Sequence Mag (Deadband)	100	LD0.VSMSQI2.SeqV.c3.cVal.mag.f

Table 118: SP-SE (1):Single-phase power and energy measurement - instance 1 (SPEMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		370	Class 2 and 0	Yes	SP-SE (1) Phase A Active Power	100	LD0.SPEMMXU1.W.phsA.cVal.mag.f
AI		371	Class 2 and 0	Yes	SP-SE (1) Phase B Active Power	100	LD0.SPEMMXU1.W.phsB.cVal.mag.f
AI		372	Class 2 and 0	Yes	SP-SE (1) Phase C Active Power	100	LD0.SPEMMXU1.W.phsC.cVal.mag.f
AI		373	Class 2 and 0	Yes	SP-SE (1) Phase A Reactive Power	100	LD0.SPEMMXU1.VAr.phsA.cVal.mag.f
AI		374	Class 2 and 0	Yes	SP-SE (1) Phase B Reactive Power	100	LD0.SPEMMXU1.VAr.phsB.cVal.mag.f
AI		375	Class 2 and 0	Yes	SP-SE (1) Phase C Reactive Power	100	LD0.SPEMMXU1.VAr.phsC.cVal.mag.f
AI		376	Class 2 and 0	Yes	SP-SE (1) Phase A Apparent Power	100	LD0.SPEMMXU1.VA.phsA.cVal.mag.f

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		377	Class 2 and 0	Yes	SP-SE (1) Phase B Apparent Power	100	LD0.SPEMMXU1.VA.phsB.cVal.mag.f
AI		378	Class 2 and 0	Yes	SP-SE (1) Phase C Apparent Power	100	LD0.SPEMMXU1.VA.phsC.cVal.mag.f
AI		379	Class 2 and 0	Yes	SP-SE (1) Average A Power Factor	100	LD0.SPEMMXU1.PF.phsA.cVal.mag.f
AI		380	Class 2 and 0	Yes	SP-SE (1) Average B Power Factor	100	LD0.SPEMMXU1.PF.phsB.cVal.mag.f
AI		381	Class 2 and 0	Yes	SP-SE (1) Average C Power Factor	100	LD0.SPEMMXU1.PF.phsC.cVal.mag.f

Table 119: SP-SE (1):Single-phase power and energy measurement - instance 1 (SPEMMTR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	577	Class 0	Yes	SP-SE (1) Reset of accumulated energy readings		LD0.SPEMMTR1.SupDmdRs.stVal

Table 120: SP-SE (2):Single-phase power and energy measurement - instance 2 (SPEMMXU2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		382	Class 2 and 0	Yes	SP-SE (2) Phase A Active Power	100	LD0.SPEMMXU2.W.phsA.cVal.mag.f
AI		383	Class 2 and 0	Yes	SP-SE (2) Phase B Active Power	100	LD0.SPEMMXU2.W.phsB.cVal.mag.f
AI		384	Class 2 and 0	Yes	SP-SE (2) Phase C Active Power	100	LD0.SPEMMXU2.W.phsC.cVal.mag.f
AI		385	Class 2 and 0	Yes	SP-SE (2) Phase A Reactive Power	100	LD0.SPEMMXU2.VAr.phsA.cVal.mag.f
AI		386	Class 2 and 0	Yes	SP-SE (2) Phase B Reactive Power	100	LD0.SPEMMXU2.VAr.phsB.cVal.mag.f
AI		387	Class 2 and 0	Yes	SP-SE (2) Phase C Reactive Power	100	LD0.SPEMMXU2.VAr.phsC.cVal.mag.f
AI		388	Class 2 and 0	Yes	SP-SE (2) Phase A Apparent Power	100	LD0.SPEMMXU2.VA.phsA.cVal.mag.f
AI		389	Class 2 and 0	Yes	SP-SE (2) Phase B Apparent Power	100	LD0.SPEMMXU2.VA.phsB.cVal.mag.f
AI		390	Class 2 and 0	Yes	SP-SE (2) Phase C Apparent Power	100	LD0.SPEMMXU2.VA.phsC.cVal.mag.f
AI		391	Class 2 and 0	Yes	SP-SE (2) Average A Power Factor	100	LD0.SPEMMXU2.PF.phsA.cVal.mag.f
AI		392	Class 2 and 0	Yes	SP-SE (2) Average B Power Factor	100	LD0.SPEMMXU2.PF.phsB.cVal.mag.f
AI		393	Class 2 and 0	Yes	SP-SE (2) Average C Power Factor	100	LD0.SPEMMXU2.PF.phsC.cVal.mag.f

Section 2 DNP3 data mappings

Table 121: SP-SE (2):Single-phase power and energy measurement - instance 1 (SPEMMTR2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	578	Class 0	Yes	SP-SE (2) Reset of accumulated energy readings		LD0.SPEMMTR2.SupDmdRs.stVal

Table 122: P-E (1):Three-phase power and energy measurement - instance 1 (PEMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		111	Class 2 and 0	Yes	P-E (1) Total Active Power	1	LD0.PEMMXU1.TotW.instMag.f
AI		112	Class 2 and 0	Yes	P-E (1) Total Reactive Power	1	LD0.PEMMXU1.TotVAr.instMag.f
AI		113	Class 2 and 0	Yes	P-E (1) Total Apparent Power	1	LD0.PEMMXU1.TotVA.instMag.f
AI		114	Class 2 and 0	Yes	P-E (1) Average Power Factor	100	LD0.PEMMXU1.TotPF.instMag.f

Table 123: P-E (1):Three-phase power and energy measurement - instance 1 (PEMMTR1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	184	Class 0	Yes	P-E (1) Reset Of Accumulated Energy Readings		LD0.PEMMTR1.SupDmdRs.stVal

Table 124: P-E (2):Three-phase power and energy measurement - instance 2 (PEMMXU2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		366	Class 2 and 0	Yes	P-E (2) Total Active Power	1	LD0.PEMMXU2.TotW.instMag.f
AI		367	Class 2 and 0	Yes	P-E (2) Total Reactive Power	1	LD0.PEMMXU2.TotVAr.instMag.f
AI		368	Class 2 and 0	Yes	P-E (2) Total Apparent Power	1	LD0.PEMMXU2.TotVA.instMag.f
AI		369	Class 2 and 0	Yes	P-E (2) Average Power Factor	100	LD0.PEMMXU2.TotPF.instMag.f

Table 125: P-E (2):Three-phase power and energy measurement - instance 2 (PEMMTR2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	576	Class 0	Yes	P-E (2) Reset of accumulated energy readings		LD0.PEMMTR2.SupDmdRs.stVal

Table 126: f:Frequency measurement - instance 1 (FMMXU1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		110	Class 2 and 0	Yes	Frequency	100	LD0.FMMXU1.Hz.instMag.f

Table 127: TP-1:Minimum pulse timer (2 pcs) - instance 1 (TPGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	309	Class 0	Yes	TP-1 In2/Out2		LD0.TPGAPC1.Op.general

Table 128: TP-2:Minimum pulse timer (2 pcs) - instance 2 (TPGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	310	Class 0	Yes	TP-2 In2/Out2		LD0.TPGAPC2.Op.general

Table 129: TP-3:Minimum pulse timer (2 pcs) - instance 3 (TPGAPC3)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	311	Class 0	Yes	TP-3 In2/Out2		LD0.TPGAPC3.Op.general

Table 130: TP-4:Minimum pulse timer (2 pcs) - instance 4 (TPGAPC4)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	312	Class 0	Yes	TP-4 In2/Out2		LD0.TPGAPC4.Op.general

Table 131: PT-1:Pulse timer (8 pcs) - instance 1 (PTGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	509	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 1		LD0.PTGAPC1.In1.stVal
BI	Yes	510	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 2		LD0.PTGAPC1.In2.stVal
BI	Yes	511	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 3		LD0.PTGAPC1.In3.stVal
BI	Yes	512	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 4		LD0.PTGAPC1.In4.stVal
BI	Yes	513	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 5		LD0.PTGAPC1.In5.stVal
BI	Yes	514	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 6		LD0.PTGAPC1.In6.stVal
BI	Yes	515	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 7		LD0.PTGAPC1.In7.stVal
BI	Yes	516	Class 0	Yes	PT-1 Generic Pulse Timer 1 Input 8		LD0.PTGAPC1.In8.stVal
BI	Yes	517	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 1		LD0.PTGAPC1.Q1.stVal
BI	Yes	518	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 2		LD0.PTGAPC1.Q2.stVal
BI	Yes	519	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 3		LD0.PTGAPC1.Q3.stVal
BI	Yes	520	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 4		LD0.PTGAPC1.Q4.stVal
BI	Yes	521	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 5		LD0.PTGAPC1.Q5.stVal
BI	Yes	522	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 6		LD0.PTGAPC1.Q6.stVal
BI	Yes	523	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 7		LD0.PTGAPC1.Q7.stVal
BI	Yes	524	Class 0	Yes	PT-1 Generic Pulse Timer 1 Output 8		LD0.PTGAPC1.Q8.stVal

Table 132: PT-2:Pulse timer (8 pcs) - instance 2 (PTGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	525	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 1		LD0.PTGAPC2.In1.stVal
BI	Yes	526	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 2		LD0.PTGAPC2.In2.stVal
BI	Yes	527	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 3		LD0.PTGAPC2.In3.stVal
BI	Yes	528	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 4		LD0.PTGAPC2.In4.stVal
BI	Yes	529	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 5		LD0.PTGAPC2.In5.stVal

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DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	530	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 6		LD0.PTGAPC2.In6.stVal
BI	Yes	531	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 7		LD0.PTGAPC2.In7.stVal
BI	Yes	532	Class 0	Yes	PT-2 Generic Pulse Timer 2 Input 8		LD0.PTGAPC2.In8.stVal
BI	Yes	533	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 1		LD0.PTGAPC2.Q1.stVal
BI	Yes	534	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 2		LD0.PTGAPC2.Q2.stVal
BI	Yes	535	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 3		LD0.PTGAPC2.Q3.stVal
BI	Yes	536	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 4		LD0.PTGAPC2.Q4.stVal
BI	Yes	537	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 5		LD0.PTGAPC2.Q5.stVal
BI	Yes	538	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 6		LD0.PTGAPC2.Q6.stVal
BI	Yes	539	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 7		LD0.PTGAPC2.Q7.stVal
BI	Yes	540	Class 0	Yes	PT-2 Generic Pulse Timer 2 Output 8		LD0.PTGAPC2.Q8.stVal

Table 133: TOF-1:Time delay off (8 pcs) - instance 1 (TOFGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	475	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Trip (Operate)		LD0.TOFGAPC1.Op.general
BI	Yes	476	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 1		LD0.TOFGAPC1.In1.stVal
BI	Yes	477	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 2		LD0.TOFGAPC1.In2.stVal
BI	Yes	478	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 3		LD0.TOFGAPC1.In3.stVal
BI	Yes	479	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 4		LD0.TOFGAPC1.In4.stVal
BI	Yes	480	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 5		LD0.TOFGAPC1.In5.stVal
BI	Yes	481	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 6		LD0.TOFGAPC1.In6.stVal
BI	Yes	482	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 7		LD0.TOFGAPC1.In7.stVal
BI	Yes	483	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Input 8		LD0.TOFGAPC1.In8.stVal
BI	Yes	484	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 1		LD0.TOFGAPC1.Q1.stVal
BI	Yes	485	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 2		LD0.TOFGAPC1.Q2.stVal
BI	Yes	486	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 3		LD0.TOFGAPC1.Q3.stVal
BI	Yes	487	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 4		LD0.TOFGAPC1.Q4.stVal
BI	Yes	488	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 5		LD0.TOFGAPC1.Q5.stVal
BI	Yes	489	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 6		LD0.TOFGAPC1.Q6.stVal
BI	Yes	490	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 7		LD0.TOFGAPC1.Q7.stVal
BI	Yes	491	Class 0	Yes	TOF-1 Generic Time Delay Off 1 Output 8		LD0.TOFGAPC1.Q8.stVal

Table 134: TOF-2:Time delay off (8 pcs) - instance 2 (TOFGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	492	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Trip (Operate)		LD0.TOFGAPC2.Op.general
BI	Yes	493	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 1		LD0.TOFGAPC2.In1.stVal
BI	Yes	494	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 2		LD0.TOFGAPC2.In2.stVal

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	495	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 3		LD0.TOFGAPC2.In3.stVal
BI	Yes	496	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 4		LD0.TOFGAPC2.In4.stVal
BI	Yes	497	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 5		LD0.TOFGAPC2.In5.stVal
BI	Yes	498	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 6		LD0.TOFGAPC2.In6.stVal
BI	Yes	499	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 7		LD0.TOFGAPC2.In7.stVal
BI	Yes	500	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Input 8		LD0.TOFGAPC2.In8.stVal
BI	Yes	501	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 1		LD0.TOFGAPC2.Q1.stVal
BI	Yes	502	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 2		LD0.TOFGAPC2.Q2.stVal
BI	Yes	503	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 3		LD0.TOFGAPC2.Q3.stVal
BI	Yes	504	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 4		LD0.TOFGAPC2.Q4.stVal
BI	Yes	505	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 5		LD0.TOFGAPC2.Q5.stVal
BI	Yes	506	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 6		LD0.TOFGAPC2.Q6.stVal
BI	Yes	507	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 7		LD0.TOFGAPC2.Q7.stVal
BI	Yes	508	Class 0	Yes	TOF-2 Generic Time Delay Off 2 Output 8		LD0.TOFGAPC2.Q8.stVal

Table 135: TON -1:Time delay on (8 pcs) - instance 1 (TONGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	441	Class 0	Yes	TON -1 Generic Time Delay On 1 Trip (Operate)		LD0.TONGAPC1.Op.general
BI	Yes	442	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 1		LD0.TONGAPC1.In1.stVal
BI	Yes	443	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 2		LD0.TONGAPC1.In2.stVal
BI	Yes	444	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 3		LD0.TONGAPC1.In3.stVal
BI	Yes	445	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 4		LD0.TONGAPC1.In4.stVal
BI	Yes	446	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 5		LD0.TONGAPC1.In5.stVal
BI	Yes	447	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 6		LD0.TONGAPC1.In6.stVal
BI	Yes	448	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 7		LD0.TONGAPC1.In7.stVal
BI	Yes	449	Class 0	Yes	TON -1 Generic Time Delay On 1 Input 8		LD0.TONGAPC1.In8.stVal
BI	Yes	450	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 1		LD0.TONGAPC1.Q1.stVal
BI	Yes	451	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 2		LD0.TONGAPC1.Q2.stVal
BI	Yes	452	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 3		LD0.TONGAPC1.Q3.stVal
BI	Yes	453	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 4		LD0.TONGAPC1.Q4.stVal
BI	Yes	454	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 5		LD0.TONGAPC1.Q5.stVal
BI	Yes	455	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 6		LD0.TONGAPC1.Q6.stVal
BI	Yes	456	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 7		LD0.TONGAPC1.Q7.stVal
BI	Yes	457	Class 0	Yes	TON -1 Generic Time Delay On 1 Output 8		LD0.TONGAPC1.Q8.stVal

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Table 136: TON -2:Time delay on (8 pcs) - instance 2 (TONGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	458	Class 0	Yes	TON -2 Generic Time Delay On 2 Trip (Operate)		LD0.TONGAPC2.Op.general
BI	Yes	459	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 1		LD0.TONGAPC2.In1.stVal
BI	Yes	460	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 2		LD0.TONGAPC2.In2.stVal
BI	Yes	461	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 3		LD0.TONGAPC2.In3.stVal
BI	Yes	462	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 4		LD0.TONGAPC2.In4.stVal
BI	Yes	463	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 5		LD0.TONGAPC2.In5.stVal
BI	Yes	464	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 6		LD0.TONGAPC2.In6.stVal
BI	Yes	465	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 7		LD0.TONGAPC2.In7.stVal
BI	Yes	466	Class 0	Yes	TON -2 Generic Time Delay On 2 Input 8		LD0.TONGAPC2.In8.stVal
BI	Yes	467	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 1		LD0.TONGAPC2.Q1.stVal
BI	Yes	468	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 2		LD0.TONGAPC2.Q2.stVal
BI	Yes	469	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 3		LD0.TONGAPC2.Q3.stVal
BI	Yes	470	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 4		LD0.TONGAPC2.Q4.stVal
BI	Yes	471	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 5		LD0.TONGAPC2.Q5.stVal
BI	Yes	472	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 6		LD0.TONGAPC2.Q6.stVal
BI	Yes	473	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 7		LD0.TONGAPC2.Q7.stVal
BI	Yes	474	Class 0	Yes	TON -2 Generic Time Delay On 2 Output 8		LD0.TONGAPC2.Q8.stVal

Table 137: SR-1:Set reset (8 pcs) - instance 1 (SRGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	407	Class 0	Yes	SR-1 Set-Reset Flip Flop Trip (Operate) - 1		LD0.SRGAPC1.Op.general
BI	Yes	408	Class 0	Yes	SR-1 Q1 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q1.stVal
BI	Yes	409	Class 0	Yes	SR-1 Q2 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q2.stVal
BI	Yes	410	Class 0	Yes	SR-1 Q3 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q3.stVal
BI	Yes	411	Class 0	Yes	SR-1 Q4 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q4.stVal
BI	Yes	412	Class 0	Yes	SR-1 Q5 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q5.stVal
BI	Yes	413	Class 0	Yes	SR-1 Q6 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q6.stVal
BI	Yes	414	Class 0	Yes	SR-1 Q7 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q7.stVal
BI	Yes	415	Class 0	Yes	SR-1 Q8 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Q8.stVal
BI	Yes	416	Class 0	Yes	SR-1 Set 1 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set1.stVal
BI	Yes	417	Class 0	Yes	SR-1 Set 2 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set2.stVal
BI	Yes	418	Class 0	Yes	SR-1 Set 3 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set3.stVal
BI	Yes	419	Class 0	Yes	SR-1 Set 4 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set4.stVal
BI	Yes	420	Class 0	Yes	SR-1 Set 5 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set5.stVal
BI	Yes	421	Class 0	Yes	SR-1 Set 6 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set6.stVal
BI	Yes	422	Class 0	Yes	SR-1 Set 7 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set7.stVal
BI	Yes	423	Class 0	Yes	SR-1 Set 8 Set-Reset Flip Flop - 1		LD0.SRGAPC1.Set8.stVal

Table 138: SR-2:Set reset (8 pcs) - instance 2 (SRGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	424	Class 0	Yes	SR-2 Set-Reset Flip Flop Trip (Operate) - 2		LD0.SRGAPC2.Op.general
BI	Yes	425	Class 0	Yes	SR-2 Q1 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q1.stVal
BI	Yes	426	Class 0	Yes	SR-2 Q2 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q2.stVal
BI	Yes	427	Class 0	Yes	SR-2 Q3 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q3.stVal
BI	Yes	428	Class 0	Yes	SR-2 Q4 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q4.stVal
BI	Yes	429	Class 0	Yes	SR-2 Q5 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q5.stVal
BI	Yes	430	Class 0	Yes	SR-2 Q6 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q6.stVal
BI	Yes	431	Class 0	Yes	SR-2 Q7 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q7.stVal
BI	Yes	432	Class 0	Yes	SR-2 Q8 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Q8.stVal
BI	Yes	433	Class 0	Yes	SR-2 Set 1 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set1.stVal
BI	Yes	434	Class 0	Yes	SR-2 Set 2 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set2.stVal
BI	Yes	435	Class 0	Yes	SR-2 Set 3 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set3.stVal
BI	Yes	436	Class 0	Yes	SR-2 Set 4 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set4.stVal
BI	Yes	437	Class 0	Yes	SR-2 Set 5 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set5.stVal
BI	Yes	438	Class 0	Yes	SR-2 Set 6 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set6.stVal
BI	Yes	439	Class 0	Yes	SR-2 Set 7 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set7.stVal
BI	Yes	440	Class 0	Yes	SR-2 Set 8 Set-Reset Flip Flop - 2		LD0.SRGAPC2.Set8.stVal

Table 139: MV-1:Move (8 pcs) - instance 1 (MVGAPC1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	389	Class 0	Yes	MV-1 Gen. Purp. 1 Trip (Operate)		LD0.MVGAPC1.Op.general
BI		390	Class 1 and 0	Yes	MV-1 Gen. Purp. Q1		LD0.MVGAPC1.Q1.stVal
BI		391	Class 1 and 0	Yes	MV-1 Gen. Purp. Q2		LD0.MVGAPC1.Q2.stVal
BI		392	Class 1 and 0	Yes	MV-1 Gen. Purp. Q3		LD0.MVGAPC1.Q3.stVal
BI		393	Class 1 and 0	Yes	MV-1 Gen. Purp. Q4		LD0.MVGAPC1.Q4.stVal
BI		394	Class 1 and 0	Yes	MV-1 Gen. Purp. Q5		LD0.MVGAPC1.Q5.stVal
BI		395	Class 1 and 0	Yes	MV-1 Gen. Purp. Q6		LD0.MVGAPC1.Q6.stVal
BI		396	Class 1 and 0	Yes	MV-1 Gen. Purp. Q7		LD0.MVGAPC1.Q7.stVal
BI		397	Class 1 and 0	Yes	MV-1 Gen. Purp. Q8		LD0.MVGAPC1.Q8.stVal

Table 140: MV-2:Move (8 pcs) - instance 2 (MVGAPC2)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	398	Class 0	Yes	MV-2 Gen. Purp. 2 Trip (Operate)		LD0.MVGAPC2.Op.general
BI		399	Class 1 and 0	Yes	MV-2 Gen. Purp. Q9		LD0.MVGAPC2.Q1.stVal
BI		400	Class 1 and 0	Yes	MV-2 Gen. Purp. Q10		LD0.MVGAPC2.Q2.stVal
BI		401	Class 1 and 0	Yes	MV-2 Gen. Purp. Q11		LD0.MVGAPC2.Q3.stVal
BI		402	Class 1 and 0	Yes	MV-2 Gen. Purp. Q12		LD0.MVGAPC2.Q4.stVal

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DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI		403	Class 1 and 0	Yes	MV-2 Gen. Purp. Q13		LD0.MVGAPC2.Q5.stVal
BI		404	Class 1 and 0	Yes	MV-2 Gen. Purp. Q14		LD0.MVGAPC2.Q6.stVal
BI		405	Class 1 and 0	Yes	MV-2 Gen. Purp. Q15		LD0.MVGAPC2.Q7.stVal
BI		406	Class 1 and 0	Yes	MV-2 Gen. Purp. Q16		LD0.MVGAPC2.Q8.stVal

Table 141: DFR:Disturbance recorder (RDRE1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	601	Class 0	Yes	DFR Disturbance Recording Triggered		DR.RDRE1.RcdTrg.stVal
BI	Yes	602	Class 0	Yes	DFR Clear Disturbance Recorder Memory		DR.RDRE1.MemClr.stVal
BI		603	Class 1 and 0	Yes	DFR Disturbance Recording Made		DR.RDRE1.RcdMade.stVal
AI	Yes	400	Class 0	Yes	DFR Number Of Recordings	0	DR.RDRE1.FltNum.stVal
AI	Yes	401	Class 0	Yes	DFR Recording Memory Used %	0	DR.RDRE1.MemUsed.stVal

Table 142: FR:Fault recorder (FLTMSTA1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BI	Yes	185	Class 0	Yes	Reset Fault Records		LD0.FLTMSTA1.RecRs.stVal
AI		116	Class 2 and 0	Yes	Last Fault: Fault Record Operation Counter	1	LD0.FLTMSTA1.OpCnt.stVal
AI		117	Class 2 and 0	Yes	Last Fault: Max Start Duration Of All Stages During The Fault	1	LD0.FLTMSTA1.StrDur.mag.f
AI		118	Class 2 and 0	Yes	Last Fault: Maximum Differential Current Phase A	1	LD0.FLTMSTA1.MxDifAClCA.mag.f
AI		119	Class 2 and 0	Yes	Last Fault: Maximum Differential Current Phase B	1	LD0.FLTMSTA1.MxDifAClCB.mag.f
AI		120	Class 2 and 0	Yes	Last Fault: Maximum Differential Current Phase C	1	LD0.FLTMSTA1.MxDifAClCC.mag.f
AI		121	Class 2 and 0	Yes	Last Fault: Maximum Bias Current Phase A	1	LD0.FLTMSTA1.MxRstAClCA.mag.f
AI		122	Class 2 and 0	Yes	Last Fault: Maximum Bias Current Phase B	1	LD0.FLTMSTA1.MxRstAClCB.mag.f
AI		123	Class 2 and 0	Yes	Last Fault: Maximum Bias Current Phase C	1	LD0.FLTMSTA1.MxRstAClCC.mag.f
AI		124	Class 2 and 0	Yes	Last Fault: Differential Current Phase A	1	LD0.FLTMSTA1.DifAmpsA.mag.f
AI		125	Class 2 and 0	Yes	Last Fault: Differential Current Phase B	1	LD0.FLTMSTA1.DifAmpsB.mag.f
AI		126	Class 2 and 0	Yes	Last Fault: Differential Current Phase C	1	LD0.FLTMSTA1.DifAmpsC.mag.f
AI		127	Class 2 and 0	Yes	Last Fault: Bias Current Phase A	1	LD0.FLTMSTA1.RstAmpsA.mag.f
AI		128	Class 2 and 0	Yes	Last Fault: Bias Current Phase B	1	LD0.FLTMSTA1.RstAmpsB.mag.f
AI		129	Class 2 and 0	Yes	Last Fault: Bias Current Phase C	1	LD0.FLTMSTA1.RstAmpsC.mag.f
AI		130	Class 2 and 0	Yes	Last Fault: Differential Current Residual	1	LD0.FLTMSTA1.DifAmpsN.mag.f

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		131	Class 2 and 0	Yes	Last Fault: Bias Current Residual	1	LD0.FLTMSTA1.RstAmpsN.mag.f
AI		132	Class 2 and 0	Yes	Last Fault: Max Phase A Current Magnitude	1	LD0.FLTMSTA1.MaxAmpsA.mag.f
AI		133	Class 2 and 0	Yes	Last Fault: Max Phase B Current Magnitude	1	LD0.FLTMSTA1.MaxAmpsB.mag.f
AI		134	Class 2 and 0	Yes	Last Fault: Max Phase C Current Magnitude	1	LD0.FLTMSTA1.MaxAmpsC.mag.f
AI		135	Class 2 and 0	Yes	Last Fault: Max Neutral Current Magnitude	1	LD0.FLTMSTA1.MaxAmpsN.mag.f
AI		136	Class 2 and 0	Yes	Last Fault: Phase A Current Magnitude	1	LD0.FLTMSTA1.AmpsA.mag.f
AI		137	Class 2 and 0	Yes	Last Fault: Phase B Current Magnitude	1	LD0.FLTMSTA1.AmpsB.mag.f
AI		138	Class 2 and 0	Yes	Last Fault: Phase C Current Magnitude	1	LD0.FLTMSTA1.AmpsC.mag.f
AI		139	Class 2 and 0	Yes	Last Fault: Neutral Current Magnitude	1	LD0.FLTMSTA1.AmpsN.mag.f
AI		140	Class 2 and 0	Yes	Last Fault: Calculated Residual Current Magnitude	1	LD0.FLTMSTA1.AmpsNClc.mag.f
AI		141	Class 2 and 0	Yes	Last Fault: Positive Sequence Current Mag.	1	LD0.FLTMSTA1.AmpsPsSeq.mag.f
AI		142	Class 2 and 0	Yes	Last Fault: Negative Sequence Current Mag.	1	LD0.FLTMSTA1.AmpsNgSeq.mag.f
AI		143	Class 2 and 0	Yes	Last Fault: Maximum Phase A Current (B)	1	LD0.FLTMSTA1.MaxAmpsAb.mag.f
AI		144	Class 2 and 0	Yes	Last Fault: Maximum Phase B Current (B)	1	LD0.FLTMSTA1.MaxAmpsBb.mag.f
AI		145	Class 2 and 0	Yes	Last Fault: Maximum Phase C Current (B)	1	LD0.FLTMSTA1.MaxAmpsCb.mag.f
AI		146	Class 2 and 0	Yes	Last Fault: Maximum Residual Current (B)	1	LD0.FLTMSTA1.MaxAmpsNb.mag.f
AI		147	Class 2 and 0	Yes	Last Fault: Phase A Current (B)	1	LD0.FLTMSTA1.AmpsAb.mag.f
AI		148	Class 2 and 0	Yes	Last Fault: Phase B Current (B)	1	LD0.FLTMSTA1.AmpsBb.mag.f
AI		149	Class 2 and 0	Yes	Last Fault: Phase C Current (B)	1	LD0.FLTMSTA1.AmpsCb.mag.f
AI		150	Class 2 and 0	Yes	Last Fault: Residual Current (B)	1	LD0.FLTMSTA1.AmpsNb.mag.f
AI		151	Class 2 and 0	Yes	Last Fault: Calculated Residual Current (B)	1	LD0.FLTMSTA1.AmpsNClcb.mag.f
AI		152	Class 2 and 0	Yes	Last Fault: Positive Sequence Current (B)	1	LD0.FLTMSTA1.AmpsPsSeqb.mag.f
AI		153	Class 2 and 0	Yes	Last Fault: Negative Sequence Current (B)	1	LD0.FLTMSTA1.AmpsNgSeqb.mag.f
AI		154	Class 2 and 0	Yes	Last Fault: Phase A Voltage Magnitude	1	LD0.FLTMSTA1.VoltsA.mag.f
AI		155	Class 2 and 0	Yes	Last Fault: Phase B Voltage Magnitude	1	LD0.FLTMSTA1.VoltsB.mag.f
AI		156	Class 2 and 0	Yes	Last Fault: Phase C Voltage Magnitude	1	LD0.FLTMSTA1.VoltsC.mag.f
AI		157	Class 2 and 0	Yes	Last Fault: Phase AB Voltage Magnitude	1	LD0.FLTMSTA1.VoltsAB.mag.f
AI		158	Class 2 and 0	Yes	Last Fault: Phase BC Voltage Magnitude	1	LD0.FLTMSTA1.VoltsBC.mag.f
AI		159	Class 2 and 0	Yes	Last Fault: Phase CA Voltage Magnitude	1	LD0.FLTMSTA1.VoltsCA.mag.f
AI		160	Class 2 and 0	Yes	Last Fault: Measured Residual Voltage Magnitude	1	LD0.FLTMSTA1.VoltsN.mag.f

Section 2 DNP3 data mappings

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
AI		161	Class 2 and 0	Yes	Last Fault: Zero Sequence Voltage Magnitude	1	LD0.FLTMSTA1.VZroSeq.mag.f
AI		162	Class 2 and 0	Yes	Last Fault: Positive Sequence Voltage Magnitude	1	LD0.FLTMSTA1.VPsSeq.mag.f
AI		163	Class 2 and 0	Yes	Last Fault: Negative Sequence Voltage Magnitude	1	LD0.FLTMSTA1.VNgSeq.mag.f
AI		164	Class 2 and 0	Yes	Last Fault: Phase A Voltage (B)	1	LD0.FLTMSTA1.VoltsAb.mag.f
AI		165	Class 2 and 0	Yes	Last Fault: Phase B Voltage (B)	1	LD0.FLTMSTA1.VoltsBb.mag.f
AI		166	Class 2 and 0	Yes	Last Fault: Phase C Voltage (B)	1	LD0.FLTMSTA1.VoltsCb.mag.f
AI		167	Class 2 and 0	Yes	Last Fault: Phase AB Voltage Magnitude (B)	1	LD0.FLTMSTA1.VoltsABb.mag.f
AI		168	Class 2 and 0	Yes	Last Fault: Phase BC Voltage Magnitude (B)	1	LD0.FLTMSTA1.VoltsBCb.mag.f
AI		169	Class 2 and 0	Yes	Last Fault: Phase CA Voltage Magnitude (B)	1	LD0.FLTMSTA1.VoltsCAb.mag.f
AI		170	Class 2 and 0	Yes	Last Fault: Measured Residual Voltage Magnitude (B)	1	LD0.FLTMSTA1.VoltsNb.mag.f
AI		171	Class 2 and 0	Yes	Last Fault: Zero Sequence Voltage Magnitude (B)	1	LD0.FLTMSTA1.VZroSeqb.mag.f
AI		172	Class 2 and 0	Yes	Last Fault: Positive Sequence Voltage Magnitude (B)	1	LD0.FLTMSTA1.VPsSeqb.mag.f
AI		173	Class 2 and 0	Yes	Last Fault: Negative Sequence Voltage Magnitude (B)	1	LD0.FLTMSTA1.VNgSeqb.mag.f
AI		175	Class 2 and 0	Yes	Last Fault: I2/I1 Ratio Fault	1	LD0.FLTMSTA1.PDNS1MxRat.mag.f
AI		176	Class 2 and 0	Yes	Last Fault: Frequency At The Time The Fault Is Cleared	1	LD0.FLTMSTA1.Hz.mag.f
AI		177	Class 2 and 0	Yes	Last Fault: Frequency Gradient At The Time The Fault Is Cleared	1	LD0.FLTMSTA1.HzS.mag.f
AI		178	Class 2 and 0	Yes	Last Fault: Conductance Yo	1	LD0.FLTMSTA1.CondN.mag.f
AI		179	Class 2 and 0	Yes	Last Fault: Susceptance Yo	1	LD0.FLTMSTA1.SusN.mag.f
AI		403	Class 2 and 0	Yes	Distance to fault measured in pu	1	LD0.FLTMSTA1.FltDisKm.mag.f
AI		404	Class 2 and 0	Yes	Active Setting at time of Fault	1	LD0.FLTMSTA1.ActSG.stVal
AI		405	Class 2 and 0	Yes	Last Fault: Max Temperature	1	LD0.FLTMSTA1.MaxTmpRI.mag.f

Table 143: FLO:Fault location (DRFLO1)

DNP Object Type	No Event	Point Index	DNP Class	Enabled	IEC61850 Data Attribute Name	Description	Scale Factor
BI	Yes	541	Class 0	Yes	LD0.DRFLO1.Tr.general	FLO Relay Trip	
AI		225	Class 2 and 0	Yes	LD0.DRFLO1.FltDisKm.mag.f	FLO Distance to fault measured in Km/Miles	1

2.3 DNP Binary Outputs

Table 144: DNP object type

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BO		0		Yes	Reset Indications Leds		LD0.LLN0.LEDRs1.Oper.ctIVal
BO		1		Yes	Reset Programmable Leds		LD0.LLN0.LEDRs2.Oper.ctIVal
BO		2		Yes	Reset Device		LD0.LPHD1.RsDev.Oper.ctIVal
BO		3		Yes	52CM (1) Reset Accumulation Energy		LD0.SSCBR1.RsAccAPwr.Oper.ctIVal
BO		4		Yes	52CM (1) Reset Input For Cb Remaining Life And Operation Counter		LD0.SSCBR1.RsCBWear.Oper.ctIVal
BO		5		Yes	52CM (1) Reset Recloser Travel Time		LD0.SSCBR1.RsTrvTm.Oper.ctIVal
BO		6		Yes	52CM (1) Reset Spring Charging Time		LD0.SSCBR1.RsSprChaTm.Oper.ctIVal
BO		9		Yes	X130-Output 1		LD0.XGGIO130.SPCSO1.Oper.ctIVal
BO		10		Yes	X130-Output 2		LD0.XGGIO130.SPCSO2.Oper.ctIVal
BO		11		Yes	X130-Output 3		LD0.XGGIO130.SPCSO3.Oper.ctIVal
BO		12		Yes	X110-Output 1		LD0.XGGIO110.SPCSO1.Oper.ctIVal
BO		13		Yes	X110-Output 2		LD0.XGGIO110.SPCSO2.Oper.ctIVal
BO		14		Yes	X110-Output 3		LD0.XGGIO110.SPCSO3.Oper.ctIVal
BO		15		Yes	X110-Output 4		LD0.XGGIO110.SPCSO4.Oper.ctIVal
BO		16		Yes	X100-Output 1		LD0.XGGIO100.SPCSO1.Oper.ctIVal
BO		17		Yes	X100-Output 2		LD0.XGGIO100.SPCSO2.Oper.ctIVal
BO		18		Yes	X100-Output 3		LD0.XGGIO100.SPCSO3.Oper.ctIVal
BO		19		Yes	X100-Output 4		LD0.XGGIO100.SPCSO4.Oper.ctIVal
BO		20		Yes	X100-Output 5		LD0.XGGIO100.SPCSO5.Oper.ctIVal
BO		21		Yes	X100-Output 6		LD0.XGGIO100.SPCSO6.Oper.ctIVal
BO		22		Yes	Led 1 Control		LD0.LEDGGIO1.SPCSO1.Oper.ctIVal
BO		23		Yes	Led 2 Control		LD0.LEDGGIO1.SPCSO2.Oper.ctIVal
BO		24		Yes	Led 3 Control		LD0.LEDGGIO1.SPCSO3.Oper.ctIVal

Section 2 DNP3 data mappings

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BO		25		Yes	Led 4 Control		LD0.LEDGGIO1.SPCSO4.Oper.ctlVal
BO		26		Yes	Led 5 Control		LD0.LEDGGIO1.SPCSO5.Oper.ctlVal
BO		27		Yes	Led 6 Control		LD0.LEDGGIO1.SPCSO6.Oper.ctlVal
BO		28		Yes	Led 7 Control		LD0.LEDGGIO1.SPCSO7.Oper.ctlVal
BO		29		Yes	Led 8 Control		LD0.LEDGGIO1.SPCSO8.Oper.ctlVal
BO		30		Yes	Led 9 Control		LD0.LEDGGIO1.SPCSO9.Oper.ctlVal
BO		31		Yes	Led 10 Control		LD0.LEDGGIO1.SPCSO10.Oper.ctlVal
BO		32		Yes	Led 11 Control		LD0.LEDGGIO1.SPCSO11.Oper.ctlVal
BO		33		Yes	IA IB IC (1) Reset Max Demands Source		LD0.CMSTA1.RecRs.Oper.ctlVal
BO		34		Yes	IA IB IC (2) Reset Max Demands Source		LD0.CMSTA2.RecRs.Oper.ctlVal
BO		35		Yes	P E (1) Reset Of Accumulated Energy Readings		LD0.PEMMTR1.SupDmdRs.Oper.ctlVal
BO		36		Yes	Reset Fault Records		LD0.FLTMSTA1.RecRs.Oper.ctlVal
BO		46		Yes	P E (2) Reset of accumulated energy readings		LD0.PEMMTR2.SupDmdRs.Oper.ctlVal
BO		47		Yes	SP SE (1) Reset of accumulated energy readings		LD0.SPEMMTR1.SupDmdRs.Oper.ctlVal
BO		48		Yes	SP SE (2) Reset of accumulated energy readings		LD0.SPEMMTR2.SupDmdRs.Oper.ctlVal
BO		49		Yes	52 (1) Breaker Switch Control		CTRL.CBCSWI1.Pos.Oper.ctlVal
BO		50		Yes	52 (2) Breaker Switch Control		CTRL.CBCSWI2.Pos.Oper.ctlVal
BO		51		Yes	DFR Trig Recording		DR.RDRE1.RcdTrg.Oper.ctlVal
BO		52		Yes	DFR Disturbance Records		DR.RDRE1.MemClr.Oper.ctlVal
BO		53		Yes	Reset all power quality data		LD0.LLN0.PQRs.Oper.ctlVal
BO		54		Yes	86/94-1 Clear Lockout Master Trip 1		LD0.TRPPTRC1.LORs.Oper.ctlVal
BO		55		Yes	86/94-1 Clear Master Trip1		LD0.TRPPTRC1.TrRs.Oper.ctlVal
BO		56		Yes	86/94-2 Clear Lockout Master Trip 2		LD0.TRPPTRC2.LORs.Oper.ctlVal
BO		57		Yes	86/94-2 Clear Master Trip2		LD0.TRPPTRC2.TrRs.Oper.ctlVal
BO		58		Yes	52CM (2) Reset accumulation energy		LD0.SSCBR2.RsAccAPwr.Oper.ctlVal
BO		59		Yes	52CM (2) Reset input for CB remaining life and operation counter		LD0.SSCBR2.RsCBWear.Oper.ctlVal
BO		60		Yes	52CM (2) Reset Recloser Travel Time		LD0.SSCBR2.RsTrvTm.Oper.ctlVal

DNP Object Type	No Event	Point Index	DNP Class	Enabled	Description	Scale Factor	IEC61850 Data Attribute Name
BO		61		Yes	52CM (2) Reset Spring Charging Time		LD0.SSCBR2.RsSprChaTm.Oper.ctlVal
BO		64		Yes	49T (1) Clear Temperature		LD0.T2PTTR1.RsTmp.Oper.ctlVal

Section 3 DNP3 protocol implementation

3.1 DNP3 device profile

The following table provides a device profile document in the standard format defined in the DNP3 Subset Definitions Document. While it is referred to in the DNP3 Subset Definitions as a document, it is in fact a table, and only a component of a total interoperability guide. The table, in combination with the Implementation table and the point list tables provides a complete configuration/interoperability guide for communicating with a device.

Table 145: Device profile document

DNP3 device profile document	
Vendor name:	ABB Inc.
Device name:	REF615
Highest DNP level supported: For requests: Level 2+ For responses: Level 2+	Device function: <input type="radio"/> Master <input checked="" type="radio"/> Slave
<p>Notable objects, functions, and/or qualifiers supported in addition to the highest DNP levels supported (the complete list is described in the attached table): For static (non-change-event) object requests, request qualifier codes 07 and 08 (limited quantity), and 17 and 28 (index) are supported. Static object requests sent with qualifiers 07, or 08, will be responded with qualifiers 00 or 01. 16-bit and 32-bit Analog Change Events with Time may be requested.</p>	
Maximum data link frame size (octets): Transmitted: 292 Received: 292	Maximum application fragment size (octets): Transmitted: Configurable (256...2048) Received: 2048
Maximum data link re-tries: <input type="radio"/> None <input type="radio"/> Fixed <input checked="" type="radio"/> Configurable (0...65535)	Maximum application layer re-tries: <input checked="" type="radio"/> None <input type="radio"/> Configurable
Requires data link layer confirmation: <input type="radio"/> Never <input type="radio"/> Always <input type="radio"/> Sometimes <input checked="" type="radio"/> Configurable as: "Never", "Only for multi-frame messages", or "Always"	
Requires application layer confirmation: <input type="radio"/> Never <input type="radio"/> Always <input type="radio"/> When reporting event data (slave devices only) <input type="radio"/> When sending multi-fragment responses (slave devices only) <input type="radio"/> Sometimes <input checked="" type="radio"/> Configurable as: "Only when reporting event data", or "When reporting event data or multi-fragment messages"	
Timeouts while waiting for:	
Data link confirm:	<input type="radio"/> None <input type="radio"/> Fixed at ____ <input type="radio"/> Variable <input checked="" type="radio"/> Configurable
Complete appl. fragment:	<input checked="" type="radio"/> None <input type="radio"/> Fixed at ____ <input type="radio"/> Variable <input type="radio"/> Configurable
Application confirm:	<input type="radio"/> None <input type="radio"/> Fixed at ____ <input type="radio"/> Variable <input checked="" type="radio"/> Configurable
Complete appl. response:	<input checked="" type="radio"/> None <input type="radio"/> Fixed at ____ <input type="radio"/> Variable <input type="radio"/> Configurable
Others:	Select/Operate Arm Timeout, not configurable; fixed at 10s, regardless of select timeout in the HMI. Need time interval, configurable Unsolicited notification delay, configurable Unsolicited response retry delay, configurable Unsolicited offline Interval, configurable
Sends/Executes Control Operations:	

DNP3 device profile document								
WRITE binary outputs	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
SELECT/OPERATE	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input checked="" type="radio"/>	Configurable
DIRECT OPERATE	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input checked="" type="radio"/>	Configurable
DIRECT OPERATE - NO ACK	<input type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input checked="" type="radio"/>	Configurable
Count > 1 (Count > 1 is accepted but ignored)	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Pulse on	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Pulse off	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Latch on	<input type="radio"/>	Never	<input checked="" type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Latch off	<input type="radio"/>	Never	<input checked="" type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Queue	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
Clear queue	<input checked="" type="radio"/>	Never	<input type="radio"/>	Always	<input type="radio"/>	Sometimes	<input type="radio"/>	Configurable
The circuit breaker control model is configurable for either direct or SBO mode in the circuit breaker settings. If the operation mode does not match the CROB, the returned CROB status is hardware error (4). All other control points may be controlled by either direct or SBO controls.								
Reports binary input change events when no specific variation requested:				Reports time-tagged binary input change events when no specific variation requested:				
<input type="radio"/> Never <input type="radio"/> Only when time-tagged <input type="radio"/> Only non-time-tagged <input checked="" type="radio"/> Configurable to send one or the other				<input type="radio"/> Never <input type="radio"/> Binary input change with time <input type="radio"/> Binary input change with relative time <input checked="" type="radio"/> Configurable				
Sends unsolicited responses:				Sends static data in unsolicited responses:				
<input type="radio"/> Never <input checked="" type="radio"/> Configurable <input type="radio"/> Only certain objects <input type="radio"/> Sometimes (attach explanation) <input checked="" type="radio"/> ENABLE/DISABLE UNSOLICITED function codes supported				<input checked="" type="radio"/> Never <input type="radio"/> When device restarts <input type="radio"/> When status flags change No other options are permitted.				
Default counter object/variation:				Counters roll over at:				
<input checked="" type="radio"/> No counters reported <input type="radio"/> Configurable <input type="radio"/> Default object Default variation: <input type="radio"/> Point-by-point list attached				<input checked="" type="radio"/> No counters reported <input type="radio"/> Configurable (attach explanation) <input type="radio"/> 16 bits <input type="radio"/> 32 bits <input type="radio"/> Other value: _____ <input type="radio"/> Point-by-point list attached				
Sends multi-fragment responses:								
<input checked="" type="radio"/> Yes <input type="radio"/> No								

DNP3 device profile document			
○ Configurable			
Sequential file transfer support:			
Append file mode	○ Yes	● No	
Custom status code strings	○ Yes	● No	
Permissions field	○ Yes	● No	
File events assigned to class	○ Yes	● No	
File events send immediately	○ Yes	● No	
Multiple blocks in a fragment	○ Yes	● No	
Max number of files open	0		
● = Selected, ○ = Not selected			

3.2 DNP3 implementation table

The following table identifies which object variations, function codes, and qualifiers the IED supports in both request messages and response messages. For static (non-change-event) objects, requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. Requests sent with qualifiers 17 or 28 will be responded with qualifiers 17 or 28. For change-event objects, qualifiers 17 or 28 are always responded.

Table 146: Implementation table

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
Object number	Variation number	Description	Function codes (dec)	Qualifier codes (hex)	Function codes (dec)	Qualifier codes (hex)
1	0	Binary input – any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
1	1 (default) ¹	Binary input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index) ²
1	2	Binary input with status	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
2	0	Binary input change – any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
2	1	Binary input change without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
2	2	Binary input change with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
2	3	Binary input change with relative time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
10	0	Binary output status – any variation	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
10	1	Binary output	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
12	1	Control relay output block	3 (select) 4 (operate) 5 (direct op) 6 (dir. op, noack)	17, 28 (index)	129 (response)	echo of request
30	0	Analog input - any variation	1 (read) 22 (assign class)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)		
30	1	32-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	2 (default)	16-bit analog input	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	3	32-bit analog input without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
30	4	16-bit analog input without flag	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07, 08 (limited qty) 17, 28 (index)	129 (response)	00, 01 (start-stop) 17, 28 (index)
32	0	Analog change event – any variation	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
32	1	32-bit analog change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	2	16-bit analog change event without time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
32	3	32-bit analog change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)

Section 3

DNP3 protocol implementation

OBJECT			REQUEST (Library will parse)		RESPONSE (Library will respond with)	
32	4 (default)	16-bit analog change event with time	1 (read)	06 (no range, or all) 07, 08 (limited qty)	129 (response) 130 (unsol. resp)	17, 28 (index)
50	0	Time and date				
50	1 (default)	Time and date	1 (read)	00, 01 (start-stop) 06 (no range, or all) 07 (limited qty = 1) 08 (limited qty)	129 (response)	00, 01 (start-stop) 17, 28 (index)
			2 (write)	07 (limited qty = 1)		
50	3	Time and date last recorded time	2 (write)	07 (limited qty)		
51	1	Time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
51	2	Unsynchro nized time and date CTO			129 (response) 130 (unsol. resp)	07 (limited qty) (qty = 1)
52	2	Time delay fine			129 (response)	07 (limited qty) (qty = 1)
60	0	Not defined				
60	1	Class 0 data	1 (read)	06 (no range, or all)		
60	2	Class 1 data	1 (read)	06 (no range, or all)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	07, 08 (limited qty) 06 (no range, or all)		
60	3	Class 2 data	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
60	4	Class 3 data	1 (read)	06 (no range, or all) 07, 08 (limited qty)		
			20 (enbl. unsol.) 21 (dab. unsol.) 22 (assign class)	06 (no range, or all)		
80	1	Internal indications	1 (read)	00, 01 (start-stop)		
			2 (write) ³	00 (start-stop) index=7		
No object (function code only)			13 (cold restart)		4	
No object (function code only)			14 (warm restart)			
No object (function code only)			23 (delay meas.)			
No object (function code only)			24 (record current time)			

1. A default variation refers to the variation responded when variation 0 is requested and/or in class 0, 1, 2, or 3 scans. Default variations are configurable; however, default settings for the configuration parameters are indicated in the table above.

2. For static (non-change-event) objects, qualifiers 17 or 28 are only responded when a request is sent with qualifiers 17 or 28, respectively. Otherwise, static object requests sent with qualifiers 00, 01, 06, 07, or 08, will be responded with qualifiers 00 or 01. (For change-event objects, qualifiers 17 or 28 are always responded.)
3. Writes of internal indications are only supported for index 7 (Restart IIN1-7)
4. Cold and warm restarts return an application layer acknowledge, but no restart action is taken.

Section 4 Glossary

AIM	Analog input module
ANSI	American National Standards Institute
AR	Autoreclosing
BIO	Binary input and output
CB	Circuit breaker
CBB	Cycle building block
CBFP	Circuit-breaker failure protection
CROB	Control relay output block
CTO	Common time of occurrence. The time and date CTO object is an information object that represents the absolute time of day.
CTRL	Control logical device
DFR	Digital fault recorder
DNP3	A distributed network protocol originally developed by Westronic. The DNP3 Users Group has the ownership of the protocol and assumes responsibility for its evolution.
DR	Disturbance recorder
EMC	Electromagnetic compatibility
HMI	Human-machine interface
IEC 61850	International standard for substation communication and modelling
IED	Intelligent electronic device
LD0	Logical device zero (0)
LED	Light-emitting diode
LHMI	Local human-machine interface
LLN0	Logical node zero (0)
PCM600	Protection and Control IED Manager
PSM	Power supply module
SBO	Select-before-operate
stVal	Status value

Val

Value

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